1/-

FLIGHT

and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

JANUARY 14th, 1943

ENG. LIBRARY

211/610

BRITAIN'S STRENGTH IN THE SKIES

"BEAUFIGHTERS OF COASTAL COMMAND SHOOT DOWN THREE NAZIS"

"BRISTOL" BEAUFIGHTERS, on day and night patrol over the Bay of Biscay, recently shot down a Focke-Wulf Kurier and two out of three Ju 88s sent out to protect lurking U-Boats which were trying to creep out into the Atlantic. (AIR MINISTRY BULLETIN.)

THE

"Bristol"

Beaufighter

BRITAIN'S LONG-RANGE TWIN-ENGINED FIGHTER

FLIGHT and The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH, M.B.E.

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (35 lines).

COVENTRY:	BIRMINGHAM, 2:	MANCHESTER, 3:	GLASGOW, C.2:
8-10, CORPORATION ST.	GUILDHALL BUILDINGS, NAVIGATION ST.	260, DEANSGATE.	26B, RENFIELD ST.
Telegrams: Autocar, Coventry.	*Telegrams:* Autopress, Birmingham.	*Telegrams:* Iliffe, Manchester.	*Telegrams:* Iliffe, Glasgow.
Telephone: Coventry 5210.	*Telephone:* Midland 2971 (5 lines).	*Telephone:* Blackfriars 4412.	*Telephone:* Central 4857.

Registered at the G.P.O. as a Newspaper.

No. 1777. Vol. XLIII. **January 14th, 1943.** Thursdays, One Shilling.

The Outlook

Straits of the Luftwaffe

IN the last few months we have been told several times that the *Luftwaffe* has been stretched beyond its capacity, and there has been every reason to believe that statement to be accurate. The most telling confirmation of it is contained in an announcement issued by the Soviet Information Bureau on the evening of January 5th. Recording the splendid Russian advance in Northern Caucasus which captured Nalchik and carried their armies on beyond it, the Bureau gives a list of the booty captured and of the enemy material destroyed. The captures are stated to be 150 tanks, 109 guns and large quantities of smaller stuff, but there is *no mention of aircraft*. The weapons destroyed in the same operations are given as 170 tanks, 42 guns and 18 aircraft. Only 18 aircraft accounted for in such a sweeping victory! As compared with 320 tanks and 151 guns, the figure makes one gasp. The only possible explanation seems to be that the Germans had denuded that front of aircraft in order to feed other fronts. If so, that may have had a great deal to do with the completeness of the Russian victory, for no army can hold its own in these days without an air arm, unless the enemy is likewise devoid of such an essential.

It is possible that the weather in the Northern Caucasus is now so unfavourable for flying that the Germans thought it worth while to move their air squadrons elsewhere, but even so they would hardly have taken such a risk unless the need elsewhere was very urgent—as it obviously is.

Reports from Stalingrad itself show a similar low proportion of aircraft among the material taken or destroyed.

In the Millerovo sector, due east of Stalingrad, but a long way from that heroic city, the weather, one would suppose, must be also very unfavourable for flying. In fact, the Russians report that it is hampered by frequent low cloud. None the less, Stormoviks have been in action there, flying sometimes at 150ft., to help the Russian infantry by attacking the Germans opposed to them. There the Germans are said to have nicknamed the Stormoviks "the Black Death." This also indicates that the German armies are short of air protection. How Göring must wish that he dared move large quantities of his fighters from Northern France to the Russian front! Fighter Command of the R.A.F. has made it impracticable for him to do that; and here at last we see concrete proof of the help which the R.A.F. has been able to give to our gallant Russian Ally.

Unsung Worthies

THERE can surely be few men or women in this country who do not feel a sort of impulse to salute whenever they see the badge of an air crew member on the breast of a blue uniform, and perhaps the instinct is strongest at the sight of the single wing of an air gunner. But the public seldom appreciates the work done for the cause of the United Nations by the unadorned aircraftmen who keep the machines in flying condition. The pilots and the air crews know their worth and honour them accordingly, but the public does not see and seldom reads about the perfect agonies of toil which these men endure, and endure with enthusiasm, to keep the aircraft serviceable.

The work of these men can seldom have been more exacting than in the campaign in Libya, for there to toil has been added all the discomforts of life in the desert, the heat by day, the cold by night, the myriads of flies, and the general lack of amenities. All British sailors, soldiers and airmen set much store by their meals; they are the bright spots in a life which can be dull as well as dangerous, but in the desert there can

be little pleasure in meals seldom consisting of more than bully beef and biscuits, and an inadequate supply of water—bully beef is a great promoter of thirst.

Yet now, if never before, recognition ought to be given to the work of the ground crews, and also of the R.A.F. Regiment, who followed up the advance closely, and cleared 2,000 land mines from one landing ground in 48 hours, so that fighter-bombers were able to land on the ground, get ready, and take off at once to harry Rommel's retreating men round Es Sultan, where they must have thought that they were for the time beyond the reach of pursuit. It was a magnificent piece of work.

Two Convoys

LAST week's news included the story of two convoys, and convoys always mean co-operation by sea forces and air forces. In considering the pros and cons of attacks on convoys and the losses inflicted and suffered, one must always bear in mind that the rule is, in the words of Admiral Somerville, "The convoy must go through." That means that losses have to be faced by the escort, and also that a proportion of the merchant ships may be lost. The success or failure of the operation depends on the proportion of losses to the numbers concerned.

The Japanese made a strong effort to reinforce their troops at Lae in New Guinea, presumably sending stores as well as troops. Six merchant ships were sent, with a naval escort, and there was continuous cover from short-range fighters taking off from shore airfields, for the attempt to reach Lae was made by day. As a result of Allied air attacks three of the merchantmen were set on fire, but the other three seem to have reached harbour and discharged their cargoes during the night. A later report says that three transports were sunk, but it is not clear if these were the three which were set on fire. Others were damaged, for Allied bombers pursued the convoy after it had left Lae. But cargo was landed, and that was what the enemy wanted. The price paid for this partial success was 133 aircraft probably put out of action. Allied air losses are described as slight. It is for the Japanese to consider whether the price paid was worth while.

The other convoy crossed the Atlantic, and suffered 35 attacks or attempted attacks by U-boats in the course of four days. The defence was by naval vessels and by Coastal Command aircraft, Liberators being specially mentioned. The official statement says that the co-operation of the naval vessels and the aircraft "secured the arrival in Britain of an important Atlantic convoy," but does not say if any ships were lost. Therefore, the object of the operation was achieved. It is believed that two U-boats were certainly sunk and a number of others damaged. Most important of all, the attackers were finally driven off, thus admitting their failure and probably the heaviness of their casualties. We may surely consider this action most encouraging.

CONTENTS

The Outlook	29
War in the Air	31
Here and There	34
Mosquito (B) Squadron	35
New Year Honours	38
Mohammed and the Mountain	39
Behind the Lines	40
Aircraft Characteristics	40, a and b
The Stearman in Canada	41
Gipsy's 1,260 Hours	44
Aircraft of the Anglo-American Forces	46
Correspondence	50
Service Aviation	51

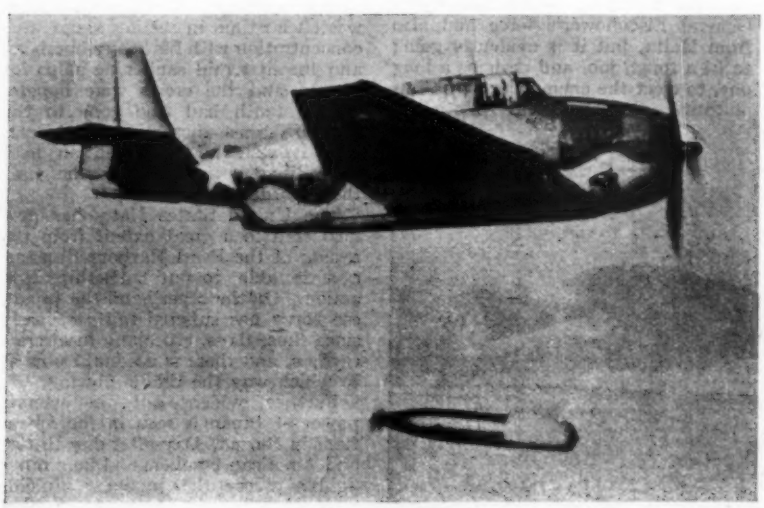
PRE-SEAFIRE FLYING. Mark III Spitfires are used by naval pilots as training machines ashore before handling Sea Hurricanes and cannon-armed Seafires from carrier decks.

HIGH FLIERS : Fortresses of the U.S. Army Air Corps in England making broad vapour trails from their engine exhausts.

WAR in the AIR

A Profit and Loss Account : In the Bay of Biscay : Activity at Rabaul : Bombing Offensive in Burma

STATISTICIANS of the Air Ministry are still busy with the records of the past year, and keep on digging out interesting figures and giving them to the world in attractive guise. One such calculation concerns the doings of Fighter Command in 1942, when it destroyed 738 enemy aircraft, roughly the equivalent of 62 squadrons of the *Luftwaffe*. This figure includes the contribution of the A.A. guns, which belong to the Army but, nevertheless, form part of Fighter Command. Of this total 443 were shot down by fighters over the Continent, 399 by day and 44 by "intruder" pilots by night. In German raids over Great Britain 118 machines were shot down by day and 177 by night. As enemy air raiding has been on a very modest scale during the year, these figures may be taken as quite satisfactory, though naturally they do not compare with the holocaust inflicted on the enemy during the Battle of Britain.



TORPEDO GONE : An Avenger launches a 21in. torpedo. It has been stated that the American 21in. torpedo carries the same amount of explosive as the British 18in. weapon. Note the exhaust and spinning propellers ; ours do not start until the water is reached.

During the year Fighter Command has been on the offensive, which means that most machines damaged over the Continent were lost to the R.A.F., though not all the pilots were killed. In such air battles our fighters get no help from our own A.A., and have to go through the *flak* of the enemy. Even so, the losses of Fighter Command were substantially below those of the enemy. The Command lost 593 machines, but 49 pilots were saved by the Air-Sea rescue service. The profit-and-loss account cannot be judged entirely by our losses in fighters, for in many cases the object of an offensive operation was to bomb some enemy target, and then the fighters were called upon to take risks in defending the bombers.

The main object of Fighter Command's offensive during the year was to force the enemy to fight, and even if we had lost rather more machines than the enemy did, the result might well have been considered satisfactory. As our losses have been substantially

WAR IN THE AIR

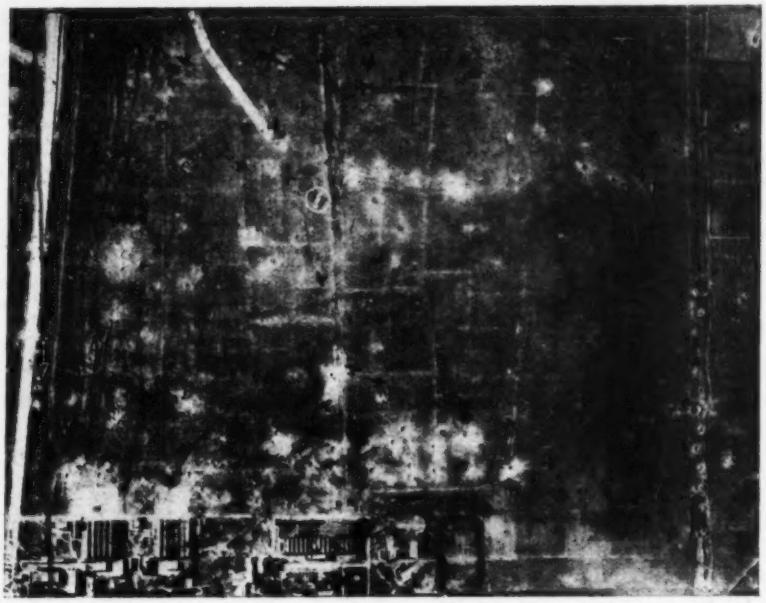
lower, in spite of our squadrons being the aggressors, the profit balance is well on our side. That our strategy has been of benefit to the Russians, by tieing down German fighter squadrons in the West, there can be no manner of doubt.

When records are in discussion, Malta must not be forgotten. During 1942 the fighters in the island destroyed 773 enemy aircraft and the A.A. gunners shot down 182. R.A.F. losses (bombers as well as fighters) were 195, but 89 pilots were saved. The R.A.F. and naval aircraft between them certainly hit 83 ships with bombs or torpedoes, and probably hit 52 more.

Co-operation in the Bay

THE destruction of a large enemy blockade-runner in the Bay of Biscay, as a result of good co-operation between Coastal Command and naval warships, makes a dramatic story. The weather was of the sort traditionally associated with the Bay, when a Coastal Wellington spotted the enemy ship and tried to attack her, without success. Of course, a message was sent to Coastal Command, and a Sunderland of an Australian squadron was despatched to the scene. The captain said the flying conditions were the worst he had experienced—low clouds, high wind, and rain. Fortunately, the aircrew included a particularly fine navigator, F/O. R. G. Bowley. First the Sunderland sighted H.M.S. *Scylla*, a 5,000-ton cruiser, and soon after found the blockade-runner. The aircraft then guided the cruiser to near the merchantman, and the captain remarked that it was "a magnificent sight" to watch the *Scylla* full out, with seas breaking over her bridge. The cruiser duly sank the blockade-runner, but the Sunderland could not wait to see the end. Her petrol was running low, and the wind had veered to the north. "In the end," said the captain, "it came to this: either we had to hit the base dead accurately or we were down in a raging sea in the dark." Bowley hit that base, though there was precious little petrol in the tanks when the Sunderland landed.

Submarines, naval aircraft, and the R.A.F. have taken a very heavy toll of the enemy ships and aircraft bringing reinforcements to Tunisia, but even so, too many have got across. The Germans there have got together a substantial amount of armour, and the transport aircraft are constantly landing on the roads, where they deposit their cargo with all speed, and take off again at once. The ports are constantly bombed by machines from General Eisenhower's force and also from Malta, but it is evidently going to be a tough job, and perhaps a long one, to eject the enemy from that important corner of Africa. However, we may find this consolation in the situation, that the Germans in Russia are now evidently short of aircraft and probably of petrol, and the Russians are taking full advantage of that.



TUNISIAN ATTACK : An air photograph of El Aouina airfield at Tunis showing the damage caused by Allied bombing.

Shipping at Rabaul

THE Japanese are evidently about to make a great effort to retrieve their position in the South West Pacific. Their men in the neighbourhood of Buna are making their last stand as these words are written, evidently determined to fight to the death. Meantime a huge concentration of ships has been sighted at Rabaul, guarded by a considerable fleet of warships. General MacArthur wasted no time in setting about this concentration with his heavy bombers, and the first raid sank nine ships for certain and the crews were hopeful that a tenth had also gone to the bottom. Since then still more vessels have arrived, and their intentions may have become manifest by the time these words are published.

The United States Navy has now recovered to a great extent from the results of the Pearl Harbour disaster, and is able to put battleships into action. On the other hand the Japanese Navy has suffered fairly severely since those days, especially in aircraft carriers, and there is no doubt now as to which way the tide is flowing.

Further evidence of the waning power of Japan is seen in the operations in Burma. Day after day British and American bombers and long-range fighters harry the Japanese airfields and other important points in that country, while the enemy has (again we must say at the moment of writing) ceased to make air raids on Calcutta. The three or four raids in

INTACT : A Heinkel He 111 and a Savoia Marchetti S.M.73P. captured undamaged on the airfield at Algiers.

ENEMY AIR LOSSES TO JAN. 9th

		Over G.B.	Over Continent	Middle East
Jan.	3	1	0	0
,,	4	2	0	0
,,	5	0	0	1
,,	6	0	0	3
,,	7	0	0	1
,,	8	0	0	6
,,	9	0	1	3
		3	1	14

Totals: West, 6,534; Middle East, over 5,162.

WAR IN THE AIR

BRITISH & U.S. AIR LOSSES TO JAN. 9th

		Over G.B. A'crft.	Over Continent B'brs.	Over Continent F'trs.	Middle East A'crft.
Jan.	3	0	3	0	1
,,	4	0	2	0	0
,,	5	0	0	0	1
,,	6	0	0	0	2
,,	7	0	0	0	1
,,	8	0	5	0	0
,,	9	0	1	1	0
		0	11	1	5

Totals: West, 5,017; Middle East, about 2,009.

which the Japanese indulged not long ago were on a very modest scale and did very little damage. So far as has been reported no damage of any military importance was done. The position no longer suggests a mighty conqueror sweeping forward in a relentless wave against a nearly helpless foe. On the contrary everyone is waiting to hear that General Wavell has begun a serious offensive with the object of reconquering Burma and opening the road to China once more. Consistent bombing of airfields is the correct preliminary to a forward move by an army, and we all know that General Wavell is not the man to stand still when he feels himself in a position to attack. There is still plenty of time for fighting during the present cold weather.

Jap Convoy Smashed

WAR news over last week-end had three high spots: the heavy raid by Bomber Command on Essen, further advances by the Russians from the Volga in the course of which they announced they had destroyed or captured no fewer than 1,947 German aircraft, and, most outstanding of all, the heavy defeat of the Japanese convoy in the New Guinea area in which Allied aircraft destroyed or damaged 133 of the enemy aircraft which tried to protect the transports and other ships. Eighty-five of those aircraft were definitely destroyed, 29 others probably destroyed, and the remaining 19 damaged. Actual figures for our own losses in this encounter were not given at the time, but General McArthur's communiqué stated that "Allied air losses were relatively light."

At least ten attacks were made on the Jap convoy within 24 hours by Flying Fortresses, Liberators, Catalinas, Marauders, Mitchells and Lightnings, and the cost to the enemy of this attempt to land reinforcements was at least three transports sunk and three more so badly mauled that their loss could safely be taken for granted. In the last phase of the battle, what has been officially described as "a sprinkling of troops" were landed at Lae, the key enemy base in New Guinea, but it is known that 1,600 Japs were drowned when two of the transports went down, so their total losses must have been considerably greater than that figure.

The battle began on the Wednesday night when the phosphorescent wake of the Jap convoy was spotted by a patrolling Catalina. The "Cat" promptly went down to the attack and from 4,000ft. scored several direct hits on the decks of one of the biggest transports, which was soon a mass of flames and sank with all on board. Soon after dawn the next day, Allied bombers and fighters arrived on the scene to hammer the ships in real earnest, in spite of the biggest umbrella yet sent up by the Japs in the South-West Pacific. American Lightnings took on the Mitsubishi Navy 00 fighters at odds of three to one, and one formation of Kittyhawks knocked down 16 Japs for the loss of one, the pilot of which baled out and was picked up safely.

Then on the Friday the combat raged from dawn to dusk, and in the course of it Mitchell bombers scored hits on two more transports, one of which was sunk and the other badly damaged. On Saturday two more transports were hit; one was hit six times and was left burning, and the other was hit fore, aft, and amidships. At noon the remnants of the Jap fleet turned and fled northwards from Lae, but Kittyhawks found a 6,000-ton transport beached near by and set it on fire with their bombs.

While the fight was going on, other aircraft attacked Lae harbour and blew up dumps, grounded enemy aircraft and barges. The Japs, in fact, were given no respite. One report said that almost every type of Allied aircraft in the S.W. Pacific went into action during the 67-hour onslaught.

Home-based bombers were also busy last week-end and, in the third raid during five days, on the Ruhr—the heart of Germany's war industry—not one of our aircraft failed to return.

Essen was the next target of importance and was raided on the Saturday night—the fifth Ruhr visit during the week—and some of our largest four-engined bombers dropped a generous number of 4,000 lb. bombs, starting many large fires.

Fleet Air Arm Entries

FOR the past 18 months the "Y" scheme method of entry has enabled promising candidates of the right type to make sure in advance of doing their war service with the Royal Navy, including the Fleet Air Arm and the Royal Marines. Thousands of young men have already joined in this way and the majority of them have justified their choice by earning commissions.

The scheme has proved such a success that the Admiralty announce that its scope is being extended.

Young men can now enrol under the "Y" scheme from the age of 16½ instead of 17. They will not be liable to be called up for service before they are 18, but volunteers for Ordinary Seaman or Royal Marine may elect to be called up at 17½ if they so desire.

It will no longer be essential to have the School Certificate in order to volunteer through the "Y" scheme for training as a naval air pilot. Members of an approved Pre-entry Training Corps can be accepted for interview by a Selection Board without the School Certificate, provided they are recommended by their Commanding Officer as suitable for flying duties with the Fleet Air Arm, have a good general education (including Mathematics) and possess good personality and powers of leadership.

To meet the case of candidates who, while otherwise suitable for training as naval air pilots, are not quite up to the educational standards required, a special educational course in the Service itself is being introduced. The course will last about two months, and candidates graded as requiring this course will be given the option of being called up at 17¾ (instead of 18) so as to enable them to start their normal service training on level terms with other candidates.

All candidates for naval air pilot who successfully complete their training, including those who have undergone the special educational course referred to above, will have equal opportunities of obtaining a commission; those, however, who do not wish to take a commission or do not reach the standard required, will now be able to serve as petty officer pilots.

The "Y" scheme method of entry remains limited to candidates picked out by the Selection Boards as being likely to do well in the Naval Service. The new regulations will, however, considerably extend its scope, and are particularly designed to encourage entry by cadets of the Sea Cadet Corps and the Air Training Corps who have taken full advantage of the opportunities for training themselves provided by these Corps.

Prospective candidates should apply at a Combined Recruiting Centre.

HERE AND THERE

The Constellation on Test

LOCKHEED'S new transport, the Constellation, which was mentioned in *Flight* of June 19th, 1941, as under development, made its maiden flight last week-end. Four 2,000 h.p. 18-cylinder double-row Wright Cyclones give it a reputed top speed in excess of 300 m.p.h., a ceiling of 35,000ft., and range of well over 3,000 miles at 250 m.p.h. at 20,000ft. It has a pressure cabin, and the pay-load is nearly 10 tons.

Seversky Speaks Out Again

MAJOR ALEXANDER SEVERSKY, who has previously expressed outspoken opinions about his country's fighter aircraft, recently told a Press representative that America should scrap all her existing fighter types and concentrate wholly on producing British Spitfires.

He deplored high-ranking U.S. officers describing American aircraft as the world's best and suggested, also, that the Lancaster should carry two tons less bomb load and two tons more armament to fit it for big daylight attacks on vital targets.

Terrain Altimeter

LAST stages in the development of an altimeter which indicates distance above ground instead of sea level and from objects such as a mountain peak, are reported to be nearing completion at the American Television Laboratories in Hollywood, California.

This was stated recently in an interview by Dr. Lee De Forest, research director of the laboratories.

Dr. De Forest described the terrain altimeter on which he is working as occupying only small space, weighing about 50 lb., and having a range of five miles downward and forward. The range of detection, however, is limited only by size of the apparatus built.

How It Works

THE equipment sends radio impulses forward and downward continuously from antennæ on the aircraft, and part of the beam is reflected from the ground, a city or even a surface craft at sea, and registered on a needle that may be located on the instrument panel.

It will be of value alike in wartime and peacetime aviation, according to the inventor, as it will warn pilots of mountain peaks and even other aircraft in time to avoid crashes.

R.O.C. Regrets

THE Correspondence page of the final issue of the Royal Observer Corps Club Journal, which incorporated the December and January editions in one number, is very naturally full of letters expressing regret that the journal will appear no more.

Flight would like to add its own tribute to this journal, whose paper licence was withdrawn on the score of its being no longer a necessity, when the official inter-services journal, *Aircraft Recognition*, made its appearance modelled on very much the same lines.

The R.O.C. Club Journal served a most useful function and had been running long enough for experience to have given it considerable merit and value.

Air Mail to Canada and U.S.

THE Postmaster-General reminds the public that the difficulty in arranging for the conveyance by air across the Atlantic of air mails for Canada, the U.S.A. and beyond is greatly increased during the winter months, and much of the correspondence has recently had to be forwarded by sea.

Every effort will continue to be made to despatch as much as possible of the corespondence by air, but no guarantee can be given that the prepayment of air mail postage on correspondence for the North Atlantic air service will result in acceleration in delivery time.

R.A.F's "CHEMIN DE FER": The North African desert may be flat enough in many places, but it is often anything but firm enough, especially in the rainy season. Here are men of the Royal Engineers laying a portable metal runway on an R.A.F. advanced airfield.

DELAYED ACTION: This is one of the first pictures to be released of the parachute bombs which the R.A.F. have been using with great effect on German targets for some little time past. They are similar in operation to the German unpleasantries we used to call land mines.

IN THE BRIEFING ROOM: Mosquito crews get last-minute instructions and all available information about their target.

Mosquito Squadron

Crews and Aircraft Have "Tails Well Up": Dominions Fully Represented: Enthusiasm for the Mosquito

IT was, if we remember correctly, Sir John Salmond who, in the 1914-18 war, sent home a signal which included the words: "The R.A.F. has its tail well up." For the benefit of our younger readers it may be explained that there was an aerodynamic as well as a canine reference in the expression. In those days engines were not very powerful, and when the power dropped through some slight disturbance in the engine, the aircraft was liable to fly with its tail down. When it had enough power it flew with the tail well up, which was thus a sign of ample "urge."

In the present war the R.A.F. still has its tail well up, and nowhere is that spirit more pronounced than in a Mosquito squadron which we visited recently. The squadron has good reason to feel pleased with life. It has done splendid work; its C.O. is Wing Commander H. I. Edwards, V.C., D.S.O., D.F.C.; it counts a number of D.F.C.s and D.F.M.s among its personnel, which include a large percentage of Canadians, Australians and New Zealanders, not to mention a couple of Norwegians and a Jamaican. It may be recalled that Wing Commander Edwards was awarded his V.C. for leading a squadron of Blenheims against Bremen in July, 1941, when that place was bombed from a height of 50ft. or so. Bombing attacks at zero height are still the speciality of this squadron, and the Mosquito has been found a very suitable type of aircraft for the

The perspex and clear-vision panel must be cleaned before going on ops. The bombs indicate 10 raids to the machine's credit.

D

ENG. LIBRARY

While the aircrews are briefed, the ground crews fuel and arm the machines.

(Above) A Mosquito becomes airborne. Shortly the undercarriage will be retracted and a course set for the target.

MOSQUITO SQUADRON

purpose on account of its great speed and excellent manœuvrability. Sometimes, if visibility is none too good, the zero business can be overdone. A short time ago one Mosquito came home from a raid with a piece of a French tree embedded in its surface.

Now and again the crews vary the ordinary routine by some exploit inspired by special circumstances. (They have to be opportunists as well as well-disciplined teams.) There is, for example, the now classic case of Sqn. Ldr. J. R. G. Ralston, D.S.O., D.F.M., and his observer Flt. Lt. S. Clayton, D.F.C., D.F.M., who saw a goods train enter a tunnel. They thought it would be a good idea to plug the tunnel and promptly placed a bomb in the entrance, just as the tail end of the train disappeared inside. They then flew along to the other end of the tunnel and planted another bomb in that. Some day we may learn what happened to that goods train. This particular crew holds something of a record in Bomber Command with the number of operation flights. Sqn. Ldr. Ralston's tally when we visited the squadron recently (it has probably been increased by now) was 74 operational flights, while that of his observer, Flt. Lt. Clayton, had reached the impressive figure of 92.

First Public Appearance

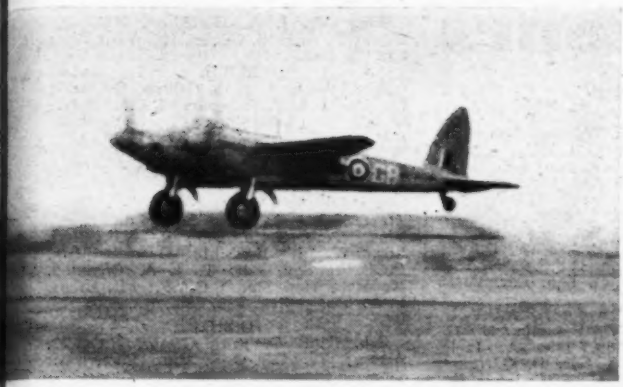
The raid on Oslo last year was the first one in which the Mosquito was mentioned in official communiques. Naturally, the raid and its results were, therefore, studied with the keenest interest in this new long-range light bomber. It aroused the admiration of the world because of the pin-point accuracy with which the bombs were dropped on Norwegian Nazi headquarters, but Mosquitos have made many equally meritorious raids since then.

It has been mentioned that the Mosquito squadrons attack from rooftop level. Usually, although not invariably, they cross the whole stretch of enemy or enemy-occupied country at the same low level. From the point of view of surprise this has great advantages, and enemy fighters cannot get under the tails of the bombers, and light *flak* is the most serious opposition encountered. Flying "by Bradshaw" has its good points, but navigation at something like four miles a minute just above the treetops is no task for a beginner. Landmarks flash past at incredible speed and there is no time to wonder whether that hill with the wood on top is the one so carefully memorised on the contour map before the start of the raid. The fact that raids are usually made at round about dawn or dusk does not make matters any easier, and the observers of these squadrons deserve the very highest praise for their skill.

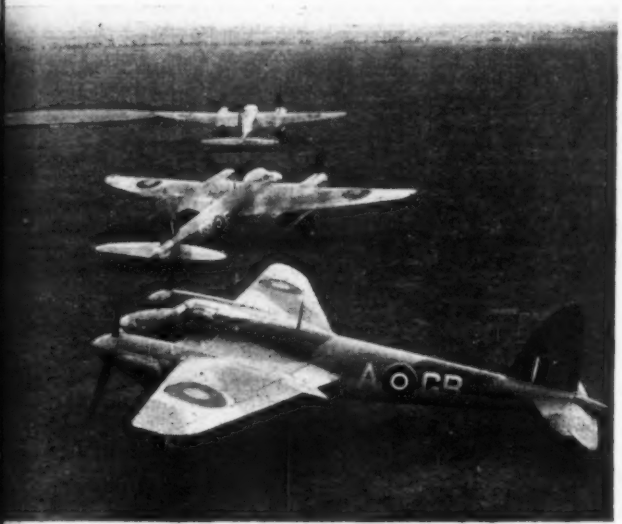
One does not have to talk for very long with Mosquito

Aircrews disperse and go to their aircraft. In the photograph is shown Wing Cdr. H. I. Edwards, V.C., and his navigator.

The picture seen by the man who looks up through the entry hatch in the floor before closing the panel. The pilot is on the right and the navigator on the left.



(Right) Back from the raid, aircrews tell of their experiences over the target and on the journey.



One by one the Mosquitoes taxi out to the take-off point to await their turn to get away.

OVER THE TARGET: A vivid photograph taken while the raid on the Philips radio factory was in progress. Pictures of this nature are taken by automatic cameras employing a prism to get the oblique angle.

crews before one discovers that they are very enthusiastic about their aircraft. When the type first went into service there were the usual stories about very high landing speeds and pronounced swing on take-off. It is inevitable that an aircraft with high wing loading should land fast, and with two powerful Rolls-Royce engines running in the same direction there is bound to be swing. But as has happened so often before, when a new type has become familiar to the crews, that which was at first regarded as a vice becomes merely a peculiarity to be remembered, and before long the correct handling technique is evolved.

Take-off Technique

The squadron which we visited has certainly discovered that swing on take-off can be checked. The tendency is to swing to port, and a little extra throttle on the port engine seems to do the trick, the two throttles being gradually brought level at the moment the aircraft is airborne. That this system works satisfactorily was shown when the squadron put up a flight of six Mosquitos to give a demonstration with practice bombs. They took off in echelon to starboard, so that there was no room for swings to port if collisions were to be avoided. The subsequent demonstration of low-level bombing gave a very good idea of the effectiveness of this method of attack. All six landings at the end of the demonstration were faultless, although the landing speed was undoubtedly fairly high. Afterwards one of the pilots gave an impressive demonstration of single-engined flying, with one airscrew stopped. The aircraft was still perfectly manœuvrable.

Since the Mosquito is of wood construction, one was naturally interested to know the opinions of crews on points connected with this feature. Damage from *Flak* or aircraft guns has been found to be exactly comparable with that sustained by metal-covered types of construction. There does not seem to be any tendency for the wood to splinter or tear off in large flakes, for example. The squadron has had several "belly landings," all of which have been made without injury to the crews, and with surprisingly little damage to the aircraft; certainly no more than would have been sustained by metal aircraft in the same circumstances.

On the handling and general comfort of the Mosquito the crews are unanimous in their praise. The cockpit is small but not unduly cramped. The layout of the different instruments and controls is good, with those most frequently needed ready to hand.

One very good feature of the Mosquito is that the ventilation system is so good that the air does not get stuffy, yet there is no trace of draught. All cracks appear to have been very effectively sealed.

New Year Honours

(Continued from page 23, January 7th)

ORDER OF THE BRITISH EMPIRE

M.B.E. (Civil Division)

H. I. F. Evenden, Rolls-Royce, Ltd.; E. Gilbert, Vickers-Armstrongs, Ltd.; W. Hayes, Met. Officer, Air Ministry; D. A. G. Jones, M.A.P.; Flt. Capt. A. F. Lingard, No. 3 Ferry Pool, A.T.A.; P. G. Livingston, M.A.P.; W. A. Needs, Bristol Aeroplane Co.; J. P. Power, M.A.P.; Capt. G. A. Regan, A.T.A.; F. R. Smith, Armstrong Whitworth, Ltd.; B. Sykes, M.A.P.; E. I. Talbot, A. V. Roe and Co., Ltd.; G. Tideswell, Senior Exec. Officer serving with Air Ministry Mission in S. Africa.

BRITISH EMPIRE MEDAL

(Civil Division)

UNITED KINGDOM

A. T. Brown, Bristol Aeroplane Co.; Miss E. B. Butchers, Covering Shop, Saunders-Roe, Ltd.; Miss A. M. Carter, Saro Laminated Wood Products, Ltd.; A. Crawford, Standard Motor Co., Ltd. (Aero Engines); W. P. Mitchell, Airspeeds (1934), Ltd.; C. Paterson, De Havilland Aircraft Co.; P. G Pearce, armament instr., R.A.F. Stn.; W. J. Pomeroy, Westlands Aircraft, Ltd.; J. A. Ramsay, Rolls-Royce, Ltd.; B. Thompson, Rotol Airscrews, Ltd.; E. A. Thorpe, British Overseas Airways Corpn.

DOMINIONS SERVICES LIST

ORDER OF THE BRITISH EMPIRE

C.B.E. (Military Division)

Wing Cdr. (Temp. Air Comdre) F. M. Bladin, R.A.A.F.

O.B.E.

Sqn. Ldr. (Temp. Grp. Capt.) J. R. Bell, R.A.A.F.; Wing Cdr. E. A. Gibson, R.N.Z.A.F.; Director of Works, Air Force H.Q.; Wing Cdr. (Temp. Grp. Capt.) T. R. Marsden, R.A.A.F.

M.B.E.

Flt. Lt. F. L. Goldsmith, R.N.Z.A.F.; F/O. (Temp. Flt. Lt. and Act. Sqn. Ldr.) G. T. W. Jensen-Muir, R.A.A.F.; F/O. (Act. Flt. Lt.) G. R. H. J. McCrae, R.A.A.F.; F/O. R. C. W. Wood, R.A.A.F.

AIR FORCE CROSS

Sqn. Ldr. J. D. Hewitt, R.N.Z.A.F.; F/O. (Temp. Sqn. Ldr.) J. G. Macdonald, R.A.A.F.; Temp. W/O. J. C. Morrison, R.A.A.F.; F/O. (Temp. Sqn. Ldr.) C. R. Strickland, R.A.A.F.; Sqn. Ldr. H. C. Walker, R.N.Z.A.F.; F/O. (Temp. Flt. Lt.) R. H. Winter, R.A.A.F. (since deceased)

BRITISH EMPIRE MEDAL

(Military Division)

Flt. Sgt. (now P/O.) W. A. Chandler, R.N.Z.A.F.; L.A/C. (Temp. Cpl.) S. J. C. Cummings, R.A.A.F.; Flt. Sgt. G. Kells, R.N.Z.A.F.

INDIA OFFICE LIST

ORDER OF THE BRITISH EMPIRE

O.B.E. (Civil Division)

Maj. W. Jones, Ch. Pilot Instr., Karachi Aero Club, Karachi.

M.B.E.

H. I'E. Tyndale-Biscoe, Ch. Pilot Instr., Madras Flying Club, Madras.

COLONIAL OFFICE LIST

ORDER OF THE BRITISH EMPIRE

O.B.E. (Civil Division)

H. P. Rowe, Chief Surveyor and Director of Civil Aviation, Tanganyika.

ROYAL AIR FORCE AWARDS

BAR TO AIR FORCE CROSS

Sqn. Ldr. D. E. Davies, D.F.C., R.A.F.V.R.

AIR FORCE CROSS

Wing. Cdr. H. R. A. Edwards; Wing Cdr. G. K. Horner; Wing Cdr. C. C. McMullen; Wing Cdr. E. T. T. Nelson; Act. Wing Cdr. R. F. Aitken; Act. Wing Cdr. W. D. David, D.F.C.; Act. Wing Cdr. R. I. K. Edwards, D.F.C.; Act. Wing Cdr. G. V. Lane, D.F.C.; Act. Wing Cdr. S. W. B. Menaul, D.F.C.; Act. Wing Cdr. G. E. Watkins; Sqn. Ldr. J. Bamber; Sqn. Ldr. A. R. Edge, A.A.F.; Sqn. Ldr. G. D. Fleming; Sqn. Ldr. H. D. Wanklyn Flower; Sqn. Ldr. J. A. Hankins; Sqn. Ldr. W. D. Hodgkinson, D.F.C.; Sqn. Ldr. W. G. Joy; Sqn. Ldr. R. M. North, D.F.C., R.A.F.V.R.; Sqn. Ldr. R. G. Taylor; Sqn. Ldr. G. B. Warner, D.F.C.; Sqn. Ldr. L. D. Wilson, D.F.C.; Act. Sqn. Ldr. R. Alexander; Act. Sqn. Ldr. P. L. Chilton.

Act. Sqn. Ldr. G. Crawford, R.A.F.V.R.; Act. Sqn. Ldr. E. G. Franklin, D.F.C., R.A.F.V.R.; Act. Sqn. Ldr. A. Ingle, R.A.F.V.R.; Act. Sqn. Ldr. D. G. Long; Act. Sqn. Ldr. T. G. Mahaddie; Flt. Lt. L. A. S. Grumbley; Flt. Lt. R. F. Hamlyn, D.F.M.; Flt. Lt. H. Hobley; Flt Lt. R. G. Honeyman; Flt. Lt. I. M. D. Little, R.A.F.V.R.; Flt. Lt. J. P. Lloyd, R.A.F.V.R.; Flt. Lt. A. S. Lucas, R.A.F.V.R.; Flt. Lt. H. Paynter; Flt. Lt. J. F. Sach, D.F.C.; Flt. Lt. H. A. Steele.

Flt. Lt. R. D. Whyard, R.A.F.V.R.; Flt. Lt. B. J. O. Winfield, R.A.F.V.R.; Flt. Lt. C. E. Young, R.A.F.V.R. (from July 13, 1942); Act. Flt. Lt. A. E. C. Agate, R.A.F.V.R.; Act. Flt. Lt. A. H. Humphrey, D.F.C.; Act. Flt. Lt. M. R. Ingle-Finch, R.A.F.V.R.; Act. Flt. Lt. F. W. M. Jensen, R.A.F.V.R.; Act. Flt. Lt. A. G. McAdam; Act. Flt. Lt. N. Montefiore, R.A.F.V.R.; Act. Flt. Lt. D. H. Walker, R.A.F.V.R.; F/O. T. C. Cooke, D.F.M., R.A.F.V.R.; F/O. J. F. P. Matthews, R.A.F.V.R.; F/O. N. Pickard; F/O. R. M. Teale; P/O. H. J. G. Alford; P/O. P. Scott, R.A.F.V.R.; W/O. C. J. Barrey, D.F.M.; W/O. J. E. Loverseed; Sqn. Ldr. C. W. Scott, R.N.Z.A.F.

AIR FORCE MEDAL

Flt. Sgt. J. W. Earl, R.A.F.V.R.; Flt. Sgt. L. Hatcher; Flt. Sgt. F. H. Miller, R.A.F.V.R.; Flt. Sgt. A. Sayner; Flt. Sgt. J. M. Stewart; Sgt. F. A. Andrews; Sgt. W. M. Hodgson; Sgt. J. D. Perring; Sgt. (now W/O.) R. J. Wainwright.

ORDER OF THE BRITISH EMPIRE

ROYAL NAVY

M.B.E. (Military Division)

Act. Temp. Lt. Cdr. (A) J. B. Digby de Mahe, R.N.V.R.

BRITISH EMPIRE MEDAL

(Military Division)

ROYAL NAVY

C.P.O. Airman J. P. Barnett; Flt. Sgt. A. H. B. Stinchcombe, R.A.F.; Temp. Cpl. A. E. Bickley, R.A.F.

ROYAL AIR FORCE

Flt. Sgts. J. D. Bradshaw, C. J. Couch, A. E. Crispin, G. Davidson, V. H. Everett, P. H. Fahy, W. E. Gregory, A. E. Head, G. R. Illsley, J. P. McLaren, J. Maund, W. J. Moon, J. S. Pennington, A. T. Smith, E. G. D. Temple, I. J. Tracy and G. G. Woodfield; Act. Flt. Sgt. W. Cummins; Sgts. S. C. Barley, H. L. Collins, C. C. Hurlock, H. Irwin, C. Kitley, O. F. Nathan, A.A.F., G. E. Perrett, A. C. Roberts, J. Stanley, and W. Woods-Hill; Act. Sgt. W. P. Suddes; Cpls. T. E. Hole, M. A. Montgomery, H. Outram, F. W. Pain, A.A.F., and T. Penn; L.A/C. N. Freeman, A.A.F.; L.A/C. W. L. Tunnicliffe; Flt. Sgt. R. E. Longard, R.C.A.F.; Flt. Sgt. L. B. Bonser, W.A.A.F.; Sgt. B. Holloway, W.A.A.F.; Sgt. E. I. D. Mosscrop, W.A.A.F.; Sgt. F. M. Watson, W.A.A.F.

D.S.M.

Cpl. W. K. Adams, R.A.F.; Cpl. G. D. Bashford, R.A.F.; Cpl. A. S. Sears, R.A.F.

AWARDS TO CANADIAN SERVICES

ORDER OF THE BRITISH EMPIRE

ROYAL CANADIAN AIR FORCE

C.B.E. (Military Division)

A.V-M. G. M. Croil, Insp. Gen. R.C.A.F.; Air Comdre. R. R. Collard, Dir. of Works and Bldgs., R.C.A.F.

O.B.E.

Wing Cdr. J. A. Hutchison, R.C.A.F.; Wing Cdr. A. H. S. Gillson, R.C.A.F.; Wing Cdr. B. Ball.

M.B.E.

Sqn. Ldr. L. J. P. A. Gelinas, R.C.A.F.; Flt. Lt. M. J. P. Delagrave, R.C.A.F.; Flt. Lt. G. C. Hipkin; Flt. Lt. J. E. Pugh, R.C.A.F.; Flt. Lt. M. W. Brown, R.C.A.F.; W/O. Cl.1 D. C. Hodson; W/O. Cl.1 R. W. Marriott; W/O. Cl.1 P. W. Palmer; W/O. Cl.1 E. A. Trezise.

Sqn. Ldr. S. A. Greene, No. 2 Serv. Flyg. Train. Sch., R.C.A.F.; Sqn. Ldr. A. G. Vince, Tech. Train. Sch., R.C.A.F.; Sqn. Ldr. W. J. Brodribb, Overseas Hq., R.C.A.F.; Sqn. Ldr. T. J. A. Cresswell, Mountain View Sta., R.C.A.F.; Flt. Lt. G. Frain, No. 31 Gen. Rec. Sch., R.C.A.F.

O.B.E.

Grp. Capt. G. R. McGregor, R.C.A.F., Alaska; Wing Cdr. C. L. Annis, Eastern Air Com., R.C.A.F.

BRITISH EMPIRE MEDAL

(Military Division)

Flt. Sgt. G. R. Slaughter, No. 3 Bombing and Gunnery Sch., R.C.A.F.; Flt. Sgt. G. H. Vacola, Conversion Train. Sqn., R.C.A.F.; Flt. Sgt. T. Stewart, No. 13 Elem. Fly. Train. Sch., R.C.A.F.; Flt. Sgt. L. S. Rocke, No. 31 Oper. Train. Unit, R.C.A.F.; Flt. Sgt. H. J. Holden, No. 33 Serv. Fly. Train. Sch., R.C.A.F.; Cpl. J. A. Bancroft, No. 2 Initial Train. Sch., R.C.A.F.; Cpl. G. L. Stentiford, No. 31 Air Nav. Sch., R.C.A.F.

Flt. Sgt. T. B. Kirkey; Flt. Sgt. J. Burianyk; Flt. Sgt. W. J. Kelly; Flt. Sgt. L. A. Yellowlees; Flt. Sgt. R. P. Charter; Cpl. T. R. K. Braund; Cpl. L. Goldstein; Cpl. J. R. A. Chartrand; L.A/C. L. A. Scrimshaw; Flt. Sgt. D. J. Page.

Flt. Sgt. R. H. Christie, No. 116 (B.R.) Sqn., R.C.A.F.; Sgt. A. Colman, No. 10 (B.R.) Sqn., R.C.A.F.

AIR FORCE AWARDS

DISTINGUISHED FLYING CROSS

Sqn. Ldr. N. E. Small; F/O. M. J. Belanger.

AIR FORCE CROSS

Flt. Lt. G. M. Cook; Flt. Lt. J. C. Mulvihill; Flt. Lt. B. H. Moffit; Flt. Lt. A. MacP. Cameron; F/O. R. R. Ingrams; P/O. D. F. Raymes; W/O. Cl. II R. F. H. Bedford.

AIR FORCE MEDAL

Flt. Sgt. E. S. Corbett; Flt. Sgt. W. H. Bulmer; Flt. Sgt. J. P. Smith; Flt. Sgt. L. J. R. Chausse; Cpl. E. W. Werry; Cpl. J. A. Glover.

DISTINGUISHED FLYING CROSS

Sqn. Ldr. K. A. Boomer.

AIR FORCE CROSS

Flt. Lt. A. W. Mitchell; Flt. Lt. P. E. Sorensen; P/O. G. W. Woods; W/O. Cl. II T. Lindsay.

AIR FORCE MEDAL

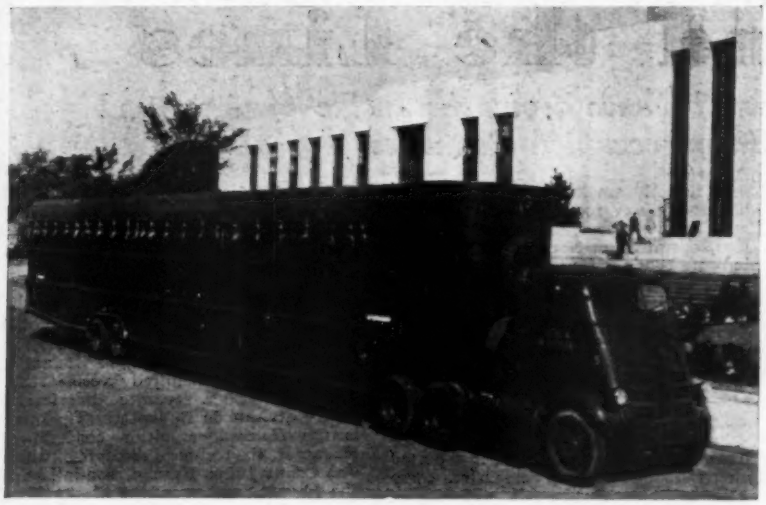
Flt. Sgt. R. Griffiths; Flt. Sgt. V. A. Sutherland.

AIR FORCE CROSS

Grp. Capt. D. M. Edwards, R.C.A.F.; Wing Cdr. R. F. Gibb, R.C.A.F.; Wing Cdr. G. E. Hall, R.C.A.F.; Wing Cdr. V. H. Patriarche, R.C.A.F.; Flt. Lt. R. B. Middleton, R.C.A.F.; Sqn. Ldr. P. E. David, R.C.A.F.; Flt. Lt. W. A. Waterton, R.C.A.F.; Flt. Lt. L. S. Montigny, R.C.A.F.; F/O. W. A. Black, R.C.A.F.; F/O. R. A. P. Bruce, R.C.A.F.; P/O. N. D. Reid, R.C.A.F.; P/O. W. B. Beat, R.C.A.F.; P/O. R. J. MacDonald, R.C.A.F.; P/O. L. G. Press, R.C.A.F.; P/O. A. W. Lockhart, R.C.A.F.

AIR FORCE MEDAL

Flt. Sgt. A. J. Morris, R.C.A.F.; Flt. Sgt. J. B. Anderson, R.C.A.F.; Sgt. H. W. German, R.C.A.F.; Sgt. H. E. Whidden, R.C.A.F.; Sgt. E. D. Fleishman, R.C.A.F.; Sgt. H. W. Fowler, R.C.A.F.; Sgt. W. P. Stevens, R.C.A.F.; Sgt. C. D. Jackson, R.C.A.F.; Sgt. N. B. Hillcoat, R.C.A.F.; Cpl. J. K. Hill, R.C.A.F.; Cpl. T. D. Reilly, R.C.A.F.; L.A/C. F. R. Duggan, R.C.A.F.; A/C.1 J. Meredith, R.C.A.F.



Mohammed and the Mountain

American Bombers Transported 2,000 Miles for Assembly : World's Largest Trailers

WHEN Henry Ford's great new bomber factory at Willow Run reaches its full stride of production within the next few months the output will be one complete Liberator four-engined bomber and two partly assembled Liberators every hour. Already the flow is steadily mounting, and several complete sets of partly assembled aircraft are leaving Willow Run daily for assembly plants in the South West of the United States, in addition to a considerable number which fly away from Willow Run's 1,000-acre airdrome.

This division of production methods has been necessitated by the fact that Willow Run was designed to produce *one* Liberator an hour, and the final assembly line was planned accordingly. Under actual production conditions it has been found that Ford mass-production methods permit the manufacture of the parts of three Liberators an hour where only one had been thought possible.

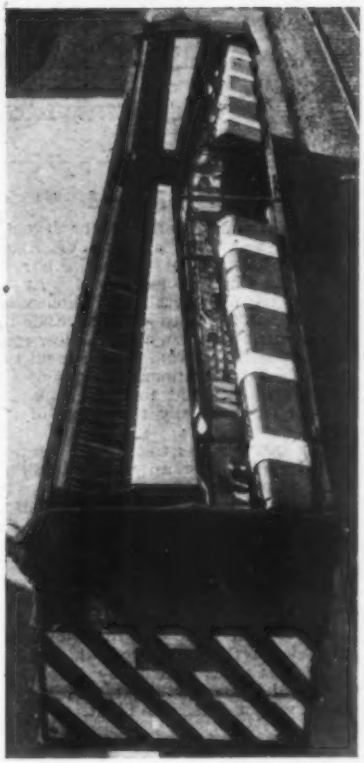
A good impression of the huge size of the trailers is conveyed by this picture, which shows three of them leaving the Ford Willow Run factory for their destination 2,000 miles away.

Since the space required for the assembly line to handle one of these large bombers an hour is 3,100ft. long by 700ft. wide, it will be seen that a vastly greater space even than that available at Willow Run would be required to cope with the complete assembly of three Liberators an hour.

Two assembly plants capable of handling these partly built aircraft were already in existence in the South-Western States, about 1,800 miles from Willow Run, and the U.S. Government decided to utilise these rather than build new factories in Michigan.

To transport the partly assembled Liberators, special trailers have been designed. The size of these huge tractor-trailers is impressive. They are said to be the largest of their type in the world. The trailers are slightly more than 60ft. long, 7ft. 6in. wide and 10ft. high.

Two trailers can carry all the components for one aircraft. One trailer carries the complete fuselage and two rudders. The other contains the wing centre sections, the two outer wings, cowlings, etc., for the four engines, two elevators and the bomb-aimer's enclosure on the lower deck.



Looking down into one of the 60-ft. trailers. Note how closely the Liberator components are packed. On the left is seen one of the complete trailers, carrying one-half of a Liberator.

The tractors have two 100 h.p. engines with synchromesh control. If one engine fails the other is strong enough to pull the loaded trailer at a reasonable speed until a repair station is reached. The combination tractor-trailer is a busy combination and keeps moving 20 hours out of the 24. The drivers alternate in five-hour shifts, leaving four one-hour periods for eating and servicing.

The tractors are not kept waiting while loading and unloading is in progress. Extra trailers are used, and the tractor coupled immediately to an empty trailer for the return trip.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Gliding Record

THE German press reports the eleventh and successful attempt of Erich Vergens, member of the N.S.F.K., to break the International record. At 10 o'clock on the morning of November 19th he was towed to a high altitude by an aircraft. At 10.49 a.m. the tow rope was released, and from that moment the prescribed International measuring instruments were said to have begun to register automatically the course of the flight.

The weather was thick fog. Vergens glided slowly over an 18,000ft. hill in order to reach the upward current. The wind was favourable and he began to cruise in the available air space, the extent of which can be judged from the fact that he had to make 2,000 turns. He maintained an altitude of about 16,400ft. By 10 p.m. he had broken the record. He is said to have remained in the air, however, till 8.18 a.m. on November 21st, when the wind dropped.

Vergens was medically examined before and after the flight, and lost 6.6 lb. in weight during his flight.

Nazi Worries

IT is reported from Stockholm that the expansion of the Norwegian war industry is meeting with serious difficulties. Owing to the shortage of construction materials and machines several important light metal works, such as the Nordag and the Norsk Light Metal Companies, are reported to have suspended their projects for the expansion of their plants and to have dismissed numbers of their employees.

It is further stated that Nordag, which only recently employed 16,000 workers, had to transfer 10,000 men to the German Labour Corps, the *Todt* organisation, operating in Norway. This would indicate that the Germans are facing the dilemma of a choice between the vital needs of their war machine and the manpower requirements for their defence structures in Norway.

Aircraft on Subs.?

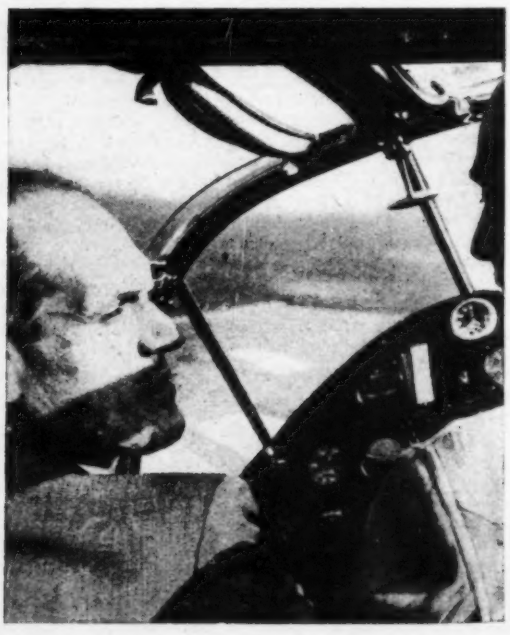
ITALIAN sources attribute the success of Axis submarines to the close operation with aircraft. It is reported that the latest German submarines carry their own reconnaissance aircraft on board. Whether the aircraft are catapulted or seaplanes lowered into the water by means of a hoist is not stated. One of the types engaged on co-operation with U-boats is known to be the Arado 196.

Reorganisation

THE V.D.M., of Frankfort-on-Main (*Vereinigte Deutsche Metallwerke*), controlled by the *Metallgesellschaft A.G.*, is to-day one of the most important organisations in the German war industry. Already in 1940 it operated twenty factories, but recently an important reorganisation has been carried out. Several V.D.M. limited companies were converted from independent units into divisions and subjected to a more stricter financial and technical centralised control. These divisions take charge of the different branches of the V.D.M. activities for the purpose of simplification of management.

Up to date the following new divisions have been reported: The V.D.M.-*Luftfahrtwerke* (aircraft works), of Frankfort-on-Main, engaged on the production and distribution of aircraft and engine instruments; the V.D.M.-*Halbzeugwerke*, of Frankfort-on-Main, engaged on the manufacture and distribution of raw materials, semi- and finished products of metals and metal alloys; The V.D.M.-*Luftfahrtwerke Steiermark*, with works in Austrian Styria, and headquarters in Frankfort-on-Main, engaged on the production and distribution of instruments.

These divisions are apparently only a part of the reorganisation carried out. The German term for this new type of organisation is *Organgesellschaft*, which can be best translated as division, i.e., not an independent company but an operating concern under a parent organisation.



Professor Messerschmitt at the controls of his "Taifun," touring aircraft.

From Hungary

TWO aircraft companies are reported to be operating in Hungary. The *Donau Flugzeugbau A.G.*, of Budapest, affiliated to the Manfred Weiss group, which has also a separate aircraft and engine division in Budapest. The other is the *Danubia* munition concern, of Budapest, the technical director of which was Count Julius Karolyi, son-in-law of the Regent, and president of the Hungarian Aero Club, who some months ago was killed in a flying accident.

French Engine

IN *Flight*, January 7th (Here and There) details were given of a new *Gnome et Rhône* 18-cylinder engine. This engine is a development of the 14R which was built before the French collapse, but appears to be now in quantity production. The engine is an air-cooled 14-cylinder twin-row type, with cylinders in nitrated steel, and a two-speed supercharger. One hundred octane fuel is used for maximum power, 92 octane fuel for continuous output.

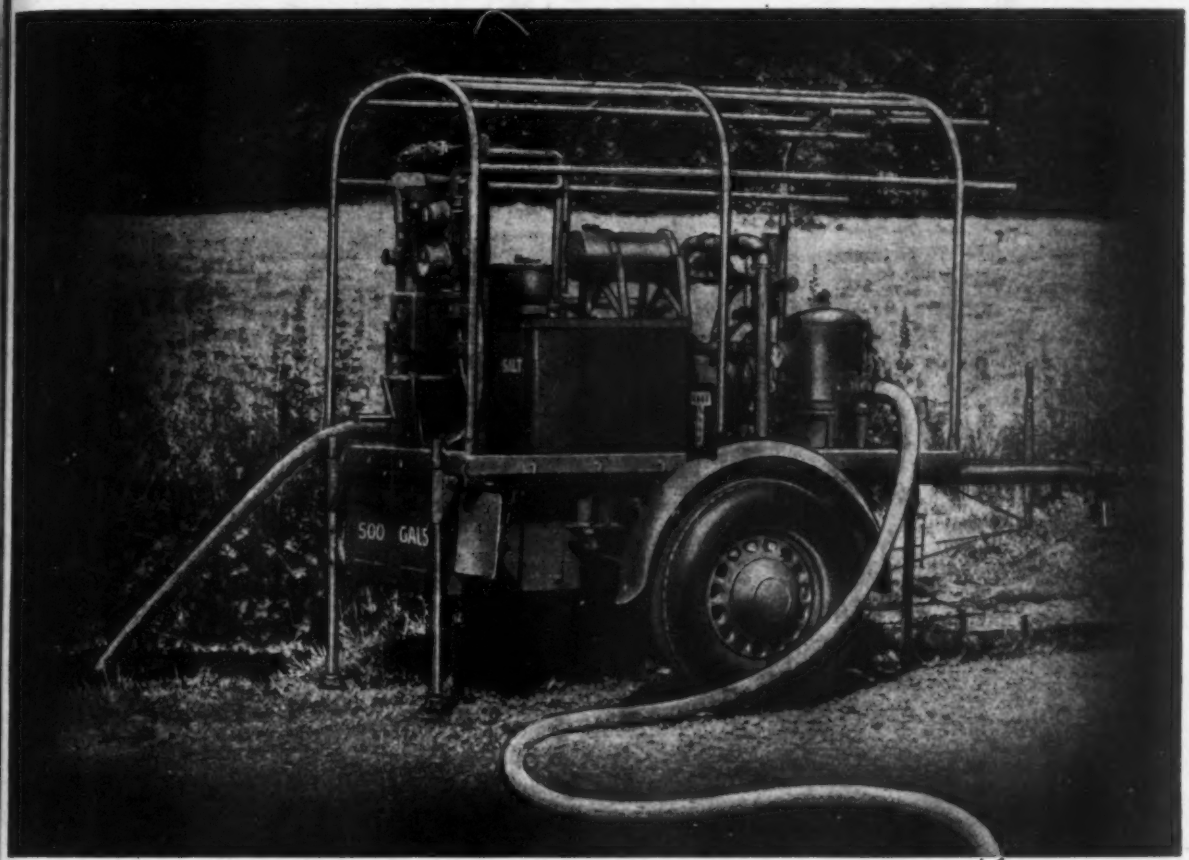
Lubrication is by means of a dual suction pump and a pressure pump; oil pressure 85 lb./sq. in. capable of boosting up to 170 lb./sq. in. for take-off, in which case the crankshaft and connecting rods are automatically lubricated by an additional jet.

The following are given as characteristics: Bore 5⅞in.; stroke 6¼in.; total swept volume 2,350 cu. in.; compression ratio 1 to 6.43; diameter 51 1/16in.; length with airscrew boss 64⅜in; weight including carburettor, fuel pump and ignition harness, 1,805 lb. Maximum power developed in low supercharger gear at 2,600 r.p.m., and 22.05 lb./sq. in. boost pressure; 1,590 h.p. at sea-level take-off output and 1,660 h.p. at 3,280ft. In high supercharger gear 1,580 h.p. at 16,400ft. Continuous power on test bed in low supercharger gear at 2,400 r.p.m., and 17.8 lb./sq. in. boost pressure 1,210 h.p. at sea-level and 1,320 h.p. at 6,890ft.; in high supercharger gear 995 h.p. at sea-level and 1,230 h.p. at 19,685ft.

Under certain air-intake and gas-exhaust conditions the maximum performances in flight are 1,645 h.p. at 21,000ft. and at 310 m.p.h.; 1,675 h.p. at 23,300ft. and at 373 m.p.h.; 1,715 h.p. at 26,250ft. and at 435 m.p.h. Continuous output in flight in low supercharger gear at 10,170ft. at 310 m.p.h. and at 2,400 r.p.m., and 17.8 lb./sq. in. is 1,365 h.p. In high supercharger gear at 24,280ft., 1,290 h.p.

Fuel consumption in low supercharger gear is 0.573 lb./h.p./hr., in high supercharger gear 0.628 lb./h.p./hr. Oil consumption in low supercharger gear is 0.022 lb./h.p./hr., and in high supercharger gear 0.025 lb./h.p./hr. Weight per h.p. at take-off output 1,135 lb., and specific output 0.675 h./cu. in.

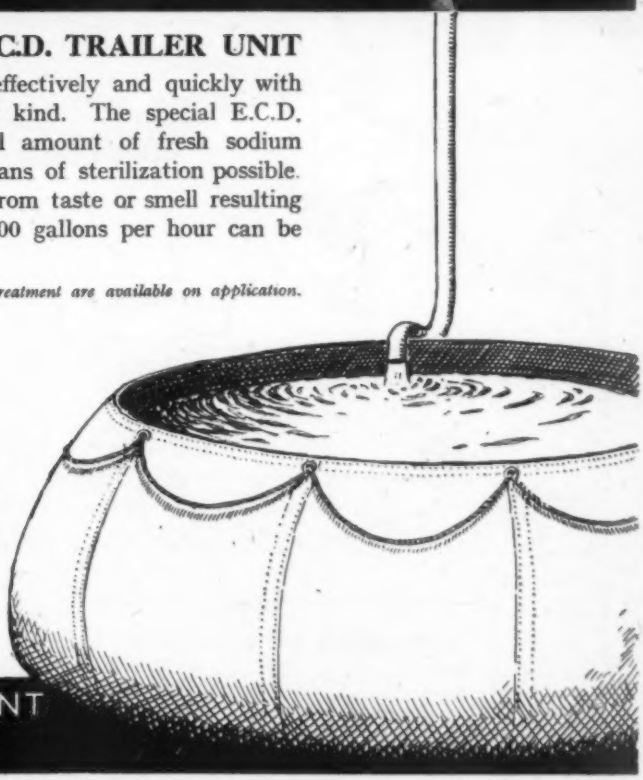
BE PREPARED FOR WATER SUPPLY EMERGENCIES



THE 500 GALLONS PER HOUR E.C.D. TRAILER UNIT

is always ready for emergencies and can deal effectively and quickly with organic pollution and turbidity of the heaviest kind. The special E.C.D. electrolytic cell produces instantly the required amount of fresh sodium hypochlorite and provides the most efficient means of sterilization possible. Water treated with this plant is absolutely free from taste or smell resulting from the treatment, and quantities of up to 3,000 gallons per hour can be delivered by mobile units.

Particulars of this plant or advice on matters concerning water treatment are available on application.



ECD

WATER TREATMENT

E.C.D. LTD. TONBRIDGE, KENT

Telephone : TONBRIDGE 737

E

Thirty-first of the New Recognition Series

Aircraft Types and

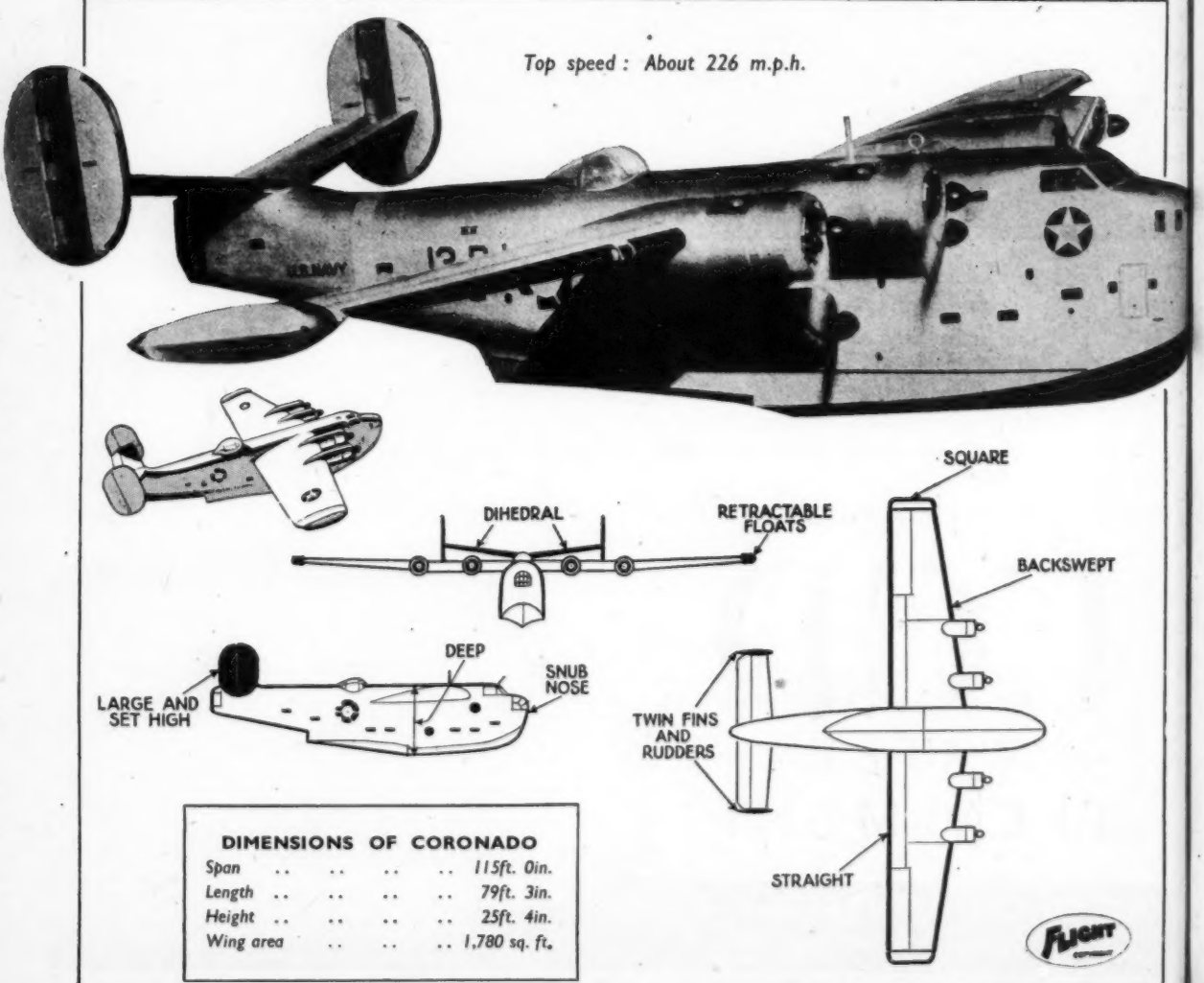
Consolidated Coronado II

THE naval version of the Consolidated Model 29 civil flying boat designed for transatlantic service, the Coronado is used by the U.S. Navy for long-range ocean patrol duties and has been a standard type employed on this important work for some little time. Although there has been no official statement on the subject, it seems quite within the bounds of possibility that this flying boat, with suitable modifications to meet the special requirements and conditions of the R.A.F., may also see service with Coastal Command to augment the Sunderlands and Catalinas.

Powered by four Pratt and Whitney Twin Wasp R-1830-SIC3-G air-cooled radial engines each developing 1,050 h.p. at 2,550 r.p.m. at 7,500ft., the performance figures of the Coronado have not been released for publication by the American authorities, but a good indication of its potentialities in this respect may be gauged from those of the civil version, which is fitted with the same engines and is identical in general structure. The Coronado may be somewhat heavier by virtue of its defensive armament, which comprises gun turrets in nose, tail and amidships above the trailing edge of the tapered, square-tipped wings, and other necessary naval equipment, but the civil version was designed to carry no fewer than 62 passengers by day and 36 by night, representing a considerable load. Then again, the comfortably upholstered seating, sleeping accommodation and other amenities provided for fare-paying civilian travellers would necessarily give way to more limited and more spartan fittings for a naval crew of perhaps nine or ten men.

Taking these factors into consideration, it seems unlikely that the ultimate difference in weight would, in an aircraft of such size, materially affect the machine's performance. The top speed of the civil version is quoted as 226 m.p.h. at 7,800ft., its cruising speed (on 75 per cent. power) 210 m.p.h. at 10,000ft., service ceiling 18,000ft., and maximum cruising range 5,200 miles.

The hull of the Coronado has two steps and a semi-circular top and is of all-metal construction; the after step terminates in a vertical knife-edge. Like the Catalina, the stabilising floats retract to form the square wing-tips, the supporting struts being recessed flush with the wings.

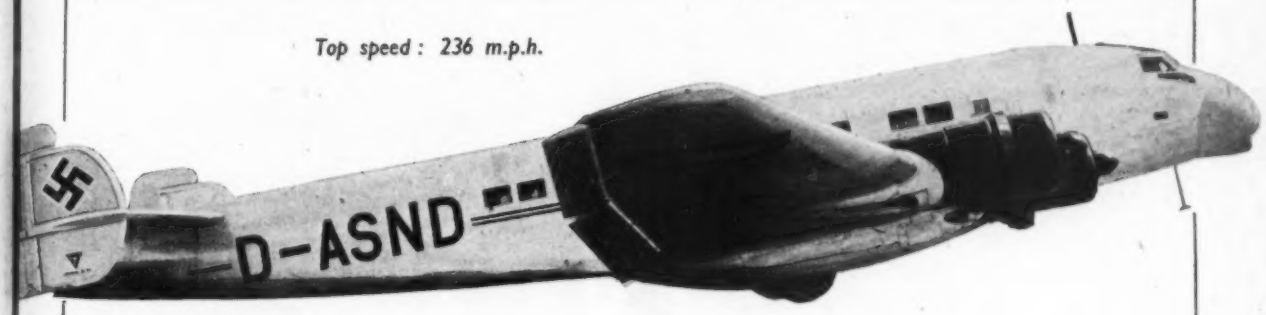


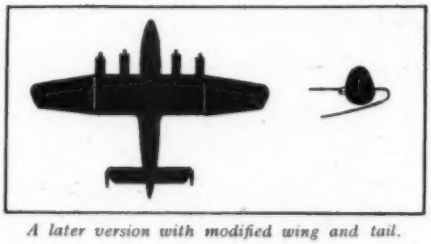
DIMENSIONS OF CORONADO

Span	*115ft. 0in.*
Length	*79ft. 3in.*
Height	*25ft. 4in.*
Wing area	*1,780 sq. ft.*

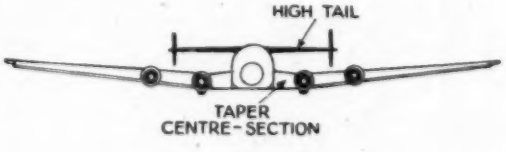
dheir Characteristics

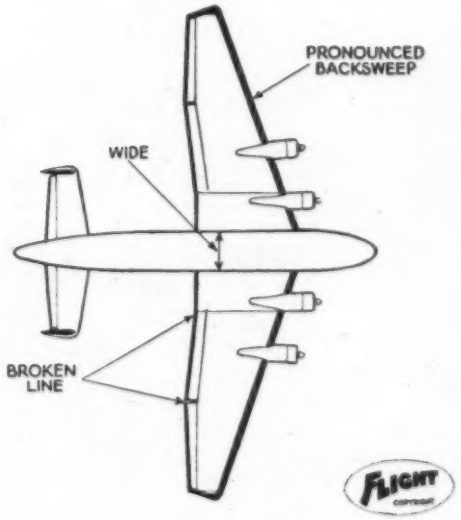
Junkers Ju 90





A later version with modified wing and tail.





DIMENSIONS OF Ju 90

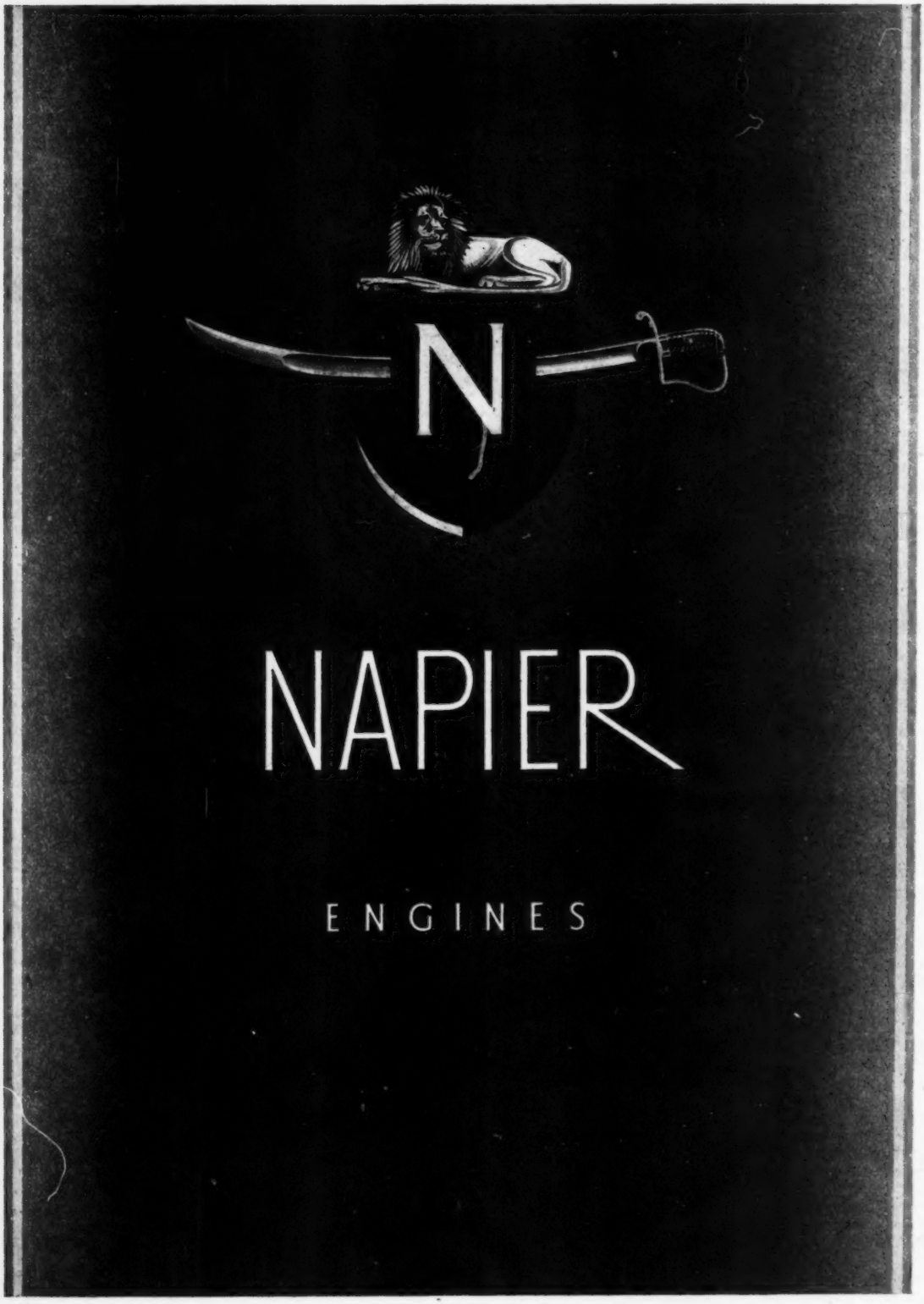
Span	*114ft. 10in.*
Length	*86ft. 3in.*
Height	*24ft. 11in.*
Wing area	*1,980 sq. ft.*

ALTHOUGH the all-up weight of the Junkers Ju 90 is somewhat less than that of the Condor and the new Heinkel He 177, it is actually Germany's largest aircraft, with a wing span of more than 114ft. and an overall length of just over 86ft. Designed originally as a passenger transport, it first flew in 1938 and went into service the same year on the Luft Hansa line between Munich, Vienna and Venice, its accommodation being for a crew of four and 40 passengers. As a goods transport it carried four tons of freight.

Like many another German design, there can be little doubt that its potentialities as a troop carrier were not overlooked by its sponsors, and although not more than 100 of this type were built, they have seen active service on many fronts for the carriage of men, guns, and all kinds of military equipment and stores.

Recently the Ju 90 has undergone certain structural modifications to the wings and vertical tail surfaces and, while no photograph of the latest type is yet available, silhouettes showing the outline of this modified version are reproduced above. From these it will be seen that the old wing formation, with its sharply backswept leading-edge and "broken line" trailing-edge, has now given place to a rectangular centre-section and tapered outer panels. The original twin rudders had, as will also be seen from the illustrations above, horn balances projecting forward over the tops of the curved fins; these units now present a much more symmetrical, egg-shaped outline.

The prototype Ju 90 was fitted with Junkers Jumo 210 liquid-cooled, inverted "V" 12-cylinder engines, each of 610 h.p., but the production models have 880 h.p. B.M.W. 132 H air-cooled radial engines which have put up the top speed to 236 m.p.h. A special military version of the Ju 90, known as the Ju 89, was built, though not in any great quantity, and several of these have been reported in the Mediterranean area; they differ from the Ju 90 troop transport chiefly in the tail assembly and in having gun turrets in the nose, tail, and above the fuselage. Wings and fuselage are of duralumin construction with stressed-skin covering, the fuselage being of the monocoque type.


N
NAPIER
ENGINES

The Stearman in Canada

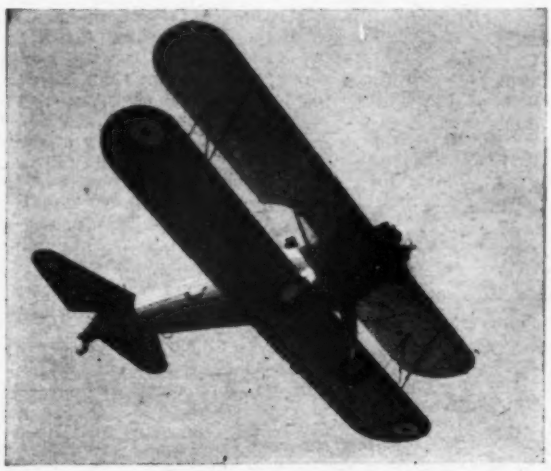
An American Standard Biplane Trainer as R.A.F., E.F.T.S. Equipment : Comparisons and Flying Characteristics : Construction and Performance

The Stearman P.T. 27 is fitted with a 220 h.p. Continental radial engine. The open cockpits are not well suited to Canadian flying weather.

ALTHOUGH the Stearman has been a standard primary trainer in the U.S. Army Air Corps for some time, and is also in use in several other countries, it was only recently adopted by the R.A.F. for elementary training in Canada. The particular model chosen, the P.T. 27, differs only in power plant and minor details from the Army Air Corps P.T. 13 and P.T. 18 and the U.S. Navy N.S. 1, all, in fact, being variations of the makers' model 73. Whereas these others are powered by Lycoming, Jacobs and Wright engines, the P.T. 27 has a 220 h.p. seven-cylinder Continental radial.

Only quite small numbers of Stearmans are in use in Canada, and these more or less as stop-gaps to be replaced by Cornells. Some schools are already Cornell-equipped. Soon to become a standard E.F.T.S. trainer, the Cornell is a Fairchild low-wing, tandem, cabin monoplane, now built under licence in Canada by Fleet Aircraft, Ltd. It is rather larger than a Miles Magister, has a six-cylinder Ranger engine of 170-200 h.p. output, and has already earned favourable comment for handling and comfort. Performance is much the same as that of the Magister, although top speed is a little lower; the differences between the standard American M-62 and the Cornell are chiefly: greater engine power, blind-flying equipment, and an enclosed cockpit with cabin heater. The Ranger engine is built in Canada under licence by the Chrysler Corporation of Canada, Ltd. Its type designation is 6-440C-5, and it is a six-cyl. in-line air-cooled inverted engine.

THIS article, by one who is in very close touch with flying training at the Canadian Elementary Flying Training Schools, affords some interesting comparisons between the Stearman and the Tiger Moth. The author regards the two types as contemporaries, with somewhat different flying characteristics.



Canadian pilots find the Stearman "very like the Harvard in its landing and behaviour on the ground." In the air it is docile.

Construction and Equipment

Like many of the older type elementary (primary) trainers, the Stearman is a tandem biplane of mixed construction. Although at a glance the wing spans appear equal, the lower planes are, in fact, one foot less in span.

The FUSELAGE has a welded steel framework of rectangular shape with fabric covering supported on drawn-section stringers and formers of light alloy. The engine mounting is also of welded steel tube construction. Immediately behind it, and round the open cockpit, the fuselage is sheet alloy covered. A light-metal fairing also encloses the rear end of the fuselage and the tail-wheel mounting. All attachment fittings are of chrome-molybdenum steel, machined or forged.

The MAIN PLANES have spruce spars and built-up spruce ribs, the joints being tacked and glued between plywood gussets.

In addition, there are duralumin compression struts, and the whole is wire braced and fabric covered. Both leading and trailing edges are alloy sections, and a thin triangular strip is attached to the leading edge of each of the main planes. This strip is understood to have a considerable effect on the air flow over the lift surfaces.

Aluminium alloy forgings are used for aileron hinge and strut fittings, but steel lugs are employed for the interplane bracing wires, of which there are two pairs of flying wires and two single landing wires on each side.

At the wing roots the main spars are reinforced to take the wing attachment fittings. Half-inch bolts with straightforward fittings are employed.

Single "N" struts are placed between planes. They are streamlined; that is, oval-section aluminium alloy tubes. The centre section struts are of the same material.

CENTRE SECTION, containing the fuel tank of 40 gallons capacity, is also wire braced fore and aft and laterally. A mirror is let into the lower side of the fuel tank.

UNDERCARRIAGE.—Similar in appearance to that of the Gladiator, the cantilever undercarriage is a bolt-attached assembly of heat-treated steel tubes and shock-absorber sockets with two "I" section steel torque arms, one behind each leg at its point of attachment. Four bolts attach the unit to the fuselage.

All tail surfaces are fabric covered and have a welded steel tube framework. Alloy trimming tabs are located on the elevators.

Hydraulic brakes are incorporated in the 24in. landing

THE STEARMAN IN CANADA

wheels, and the tail wheel is steerable throughout the range of rudder travel and free to swivel for the rest of the 360 deg. travel.

A steel airscrew is used, the pitch being adjustable only on the ground.

As a Trainer in Canada

As an elementary trainer for service pilots-to-be, the Stearman has some very good characteristics, and, in view of its similarity to the Harvard in landing and behaviour on the ground, it is specially suitable for the first instruction of single-engine pilots. It would probably take as long to solo an *ab initio* pupil on Tiger Moths following Stearman experience alone as it would to solo him on Harvards.

SOME COMPARISONS OF TIGER MOTHS AND STEARMAN.—The type of aircraft for which pilots are trained in the R.A.F. is very different now from what it was when Tiger Moths were first adopted. In spite of the feeling of affection that many pilots will hold for this excellent little aircraft, there are many instructors who firmly believe that the Tiger has now reached the end of its usefulness as an R.A.F. trainer, though probably not as a private owner or club type.

It is not suggested that the Stearman is a suitable successor to the Tiger, but rather that it is a contemporary with somewhat different flying characteristics, which must also give way to the light cabin monoplane with flaps, full blind-flying panel and other refinements now required on an ideal elementary trainer. The Stearman does, however, exhibit flying qualities which give a better grounding for a future on aircraft in use at Service Schools at the present time. Not only is it bigger and heavier, but, more important, it is a great deal more stable in the air. As a very experienced instructor recently remarked, a Stearman flies like an aircraft, but a Tiger Moth flies only like a Tiger Moth. If pressed for a more particular statement, he would no doubt have gone on to talk of weathercock stability, and the Tiger as a "rudder" aircraft.

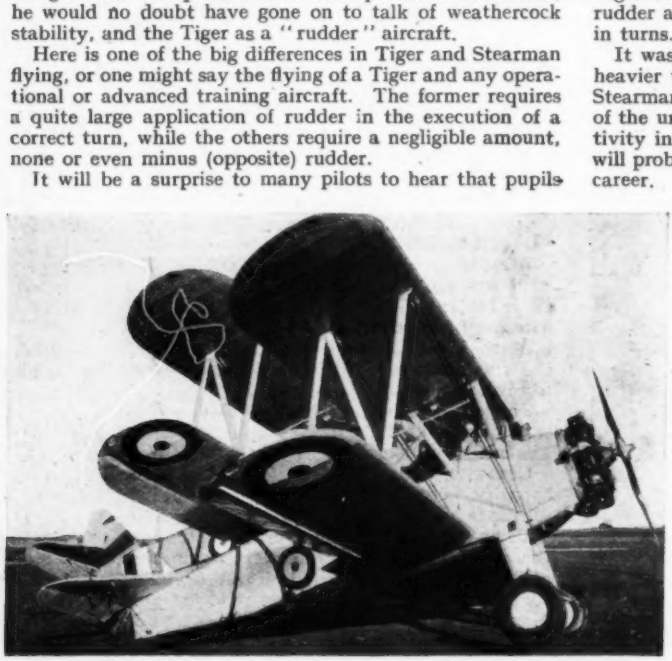
Here is one of the big differences in Tiger and Stearman flying, or one might say the flying of a Tiger and any operational or advanced training aircraft. The former requires a quite large application of rudder in the execution of a correct turn, while the others require a negligible amount, none or even minus (opposite) rudder.

It will be a surprise to many pilots to hear that pupils are now being taught that an aircraft is controlled in the air mainly by *two* primary controls—elevators and ailerons—and a secondary control, the rudder. In place of the old explanation of turning, in which bank and rudder were used together in the same direction, is now substituted the following: Apply bank in the direction in which you want to turn until the required angle is obtained; correct any tendency to slip or skid by applying a little rudder towards the slip or skid.

Although these explanations *can* be applied correctly to the Tiger Moth, it will not need a very experienced pilot to realise that they apply much more to most other types, including the Stearman. It will also be apparent to a Tiger Moth pupil that for only a secondary control the rudder assumes very considerable importance, particularly in turns.

It was stated earlier that the Stearman was bigger and heavier than a Tiger, and it is true that, by comparison, Stearman pupils are heavier on their controls. Experience of the unusual lightness of the Tiger on take-off, its sensitivity in the air, and of the long "float" before landing, will probably never be of use to a pilot in his whole service career.

"Due to its stability, many small faults are covered up, though its complete lack of vices makes the Stearman very safe."



Not an echelon to port, but two Stearmans which collided at a height of about 20ft. and landed without much damage and with no injury to the crews.

Comparisons made so far are intended as an indication of the changing requirements of flying training aircraft, and certainly not of faults in the Tiger Moth. They do, however, serve to indicate some good characteristics of the Stearman from a training point of view.

STEARMAN FAULTS?—The majority of drawbacks associated with the Stearman by instructors in Canada are not so much faults of the aircraft as they are of environment and lack of equipment. In their spiritual homes of Florida and Texas, when operating in summer conditions at low altitudes, the miserably cold and draughty cockpits and reduced performance for which they are known at Canadian airfields are non-existent.

At something over 3,000ft. for ground level, and with only two seasons—July and winter—Stearman-flying for long hours of instruction can be a definite hardship. One really wonders if those who selected Stearmans for Canadian schools ever tried to fly in an open cockpit, with a free issue of lanolin and a chamois leather face mask for comfort.

Perhaps it is not known that at many R.A.F. schools in Canada, for at least three months of

THE STEARMAN IN CANADA

the year, a representative morning temperature at sunrise would be 10 deg. below zero, with −30 deg. by no means unknown. The truth is, of course, that under such circumstances Stearmans cannot be operated. A minimum temperature for flying would appear to be about 20 deg. F. (12 deg. of frost). The fitting of cockpit heaters, as suggested in *Flight* some months ago, would only be of value with cockpit enclosures, as it is the exposed portions of the body which suffer mainly.

Useful Equipment

Two good fitments on the Stearman are the elevator trimmer, with tab movement of 15 deg. up or down, which is well designed and sensitive, and the hydraulic brake system. The brakes are operated by toe pedals on the rudder bar in a similar manner to brakes on Harvards and other trainers. A useful refinement is the provision in a roomy cockpit for adjustment over a considerable travel (four positions) of rudder pedals and over 5in, for seat height. Comfort and ease of movement are most important to a pupil.

No provision is made on the Stearman for either instruments or lights for blind-flying or night-flying, and as the elementary flying syllabus calls for some 10 hours instrument-flying and 4 hours night-flying, this at first presented a real problem to instructors. The only immediate solution was to use Tigers for these practices. This is most unsatisfactory in that the pupils, by the time they are ready for instrument-flying and night-flying, have almost forgotten the feel of the Tiger as experienced on grading course in England; and as already explained, the Stearman is quite unlike the Tiger. (For that matter, the Canadian Tiger is not by any means identical with the English type.) Instead, therefore, of getting down at once to night-flying and instrument-flying, pupils must first learn how to fly a Tiger again.

Instrument-flying is not made any easier by the fact that on the Link Trainer a standard blind-flying panel is used, while on the Canadian Tiger cheaper American instruments are fitted, so that even the turn-and-bank indicator and compass are quite different from anything to be met later on.

Generally speaking, the Stearman is an easy trainer for a pupil to fly. Due to its stability, many small faults are covered up, and its complete lack of vices makes it very safe. None of the normal manœuvres presents any difficulties, and the fact that a few pupils have trouble in keeping straight on take-off, and on the landing run, is a useful indication of a weakness in the pupil, not in the aircraft. This is helpful in weeding out an unsuitable pilot before more time or money are wasted on his training.

The Stearman is fully aerobatic, and though rather heavy to handle, once mastered, it gives a very good grounding for the next type to be encountered.

It is doubtful if any trainer has been in use for more than a week without being called underpowered. The Stearman is no exception, and the combination of heavy aircraft and low-powered engine results in a rather slow recovery following a bad landing. Every pilot would like the sort of climb attributed to a homesick angel, but realises that within reason economy must come first at an E.F.T.S.

On delivery, Stearmans have a single "tummy" belt of U.S. Army type, and in the interim while Sutton harness was being fitted many instructors learned to trust and like these belts. However, no support is given to the shoulders, and this might be very serious in a crash. It seems, in fact, that Stearmans are not very kind to their occupants in an accident.

One small hand-operated fire extinguisher is carried in the rear cockpit of the Stearman. Since it is normally flown solo from the front, it becomes probably the only R.A.F. machine in which the pilot is without some form of extinguisher. The Tiger carries a fixed extinguisher for the engine and a separate hand-operated Pyrene.

Performance is little better than that of most biplane trainers. With an airfield at approximately 3,000ft., the initial climb is usually between 600ft. and 700ft. per min., and the cruising speed at 5,000ft. is about 90 m.p.h. at 1,850 r.p.m. Maximum speed at the same height is about 110 m.p.h. at 2,100 r.p.m. The engine revolutions vary considerably from one aircraft to another, both on the ground and in the air, chiefly as a result of different pitch settings. The slight differences in performance under these conditions are as would be expected.

Safe duration for flying by pupils is fixed at 2½ hours, although the normal fuel consumption seems to be about 10 gallons per hour at 95 m.p.h. and 5,000ft., which gives a duration of a little under 3½ hours and a safe range of about 320 miles.

Performance Figures

These figures are not so good as the makers' data, due probably to the high altitudes at which aircraft must operate in Canada, and to the fact that the airscrew pitch setting has not in every case been corrected for the altitude. In particular, r.p.m. 100 to 150 higher than those recommended are found to be necessary.

In imperial gallons the fuel capacity is 36.8 gallons and oil 3.5 gallons. At a cruising speed of 100 m.p.h. this is said to give a range of 410 miles with fuel consumption a little over 7 gal./hr. The oil consumption of 1.5 pints/hr. is usually exceeded by about 50 per cent.

At 1,650 r.p.m., the optimum cruising r.p.m., the periodic engine vibration is at its worst. This period extends roughly from 1,500 to 1,750 r.p.m.

Limitations placed on the Stearman are a maximum diving speed of 186 m.p.h., r.p.m. not to exceed 2,490. In addition, inverted flight is prohibited, as are the inverted spin, the outside loop, and the falling leaf. Flick rolls are allowed at low speeds. The aircraft is, therefore, for all normal usage, fully aerobatic. Speeds for the various manœuvres are approximately as follows: Loops at 130 m.p.h.; slow rolls at 120 m.p.h.; half-rolls off the top, 145 m.p.h. Upward rolls are also possible at about 185 m.p.h., but, unless the airscrew has coarse pitch, maximum r.p.m. must be exceeded momentarily.

For other manœuvres during training, the following speeds are observed: Glide and climb at 75 m.p.h. with about 5 m.p.h. extra speed for turns; steep turns, 85-90 m.p.h. with almost full throttle; landing approaches with or without engine, 75 m.p.h.; touch down (stall), 50 55 m.p.h.

STEARMAN PT27

Makers' Aircraft and Engine Data.

Span (Upper wing), 32ft. 2in. *Incidence*, 4 deg.
Span (Lower wing), 31ft. 2in. *Incidence*, 3 deg.
Chord, 60in.
Length, 25ft.
Height, 9ft. 8½in.
Stagger, 27in. at root.
Tare weight, 1,973 lb.
Max. weight, 2,682 lb.
Wing loading, 8.9 lb./sq. ft
Power loading, 11.96 lb./h.p.
Surface ceiling, 13,200ft.
Take off (max. weight), 915ft.; sea level, still air.
Take-off run, 535ft.
Top speed, 123.5 m.p.h. at 2,085 r.p.m. Sea level.
Operating speed, 96 m.p.h. at 1,700 r.p.m. sea level.
Stalling speed, 53 m.p.h.
Range (normal), 410 miles.
Range (high speed), 380 miles.

Continental A.C. R.670-5 engine.

7-cylinder radial. (No reduction gear.)
Bore, 5.125in.
Stroke, 4.625in
Compression ratio, 5.4 to 1.
Dry weight, 465 lb.
Rated power, 220 b.h.p at 2,075 r.p.m. at sea level.

Gipsy's 1,260 Hours

Strip Report on First Engine to Run This World-record Service Time : Condition Entirely Satisfactory : Engine Rebuilt for Further 1,260 hrs., Using Only £3 18s. Worth of Replacement Parts

A FEW months ago the overhaul period of the Gipsy Major I engine was officially extended from 1,000 hours (already a world record) to 1,260 hours. Engine No. 80821/132070, from a Tiger Moth at an Elementary Flying Training School, was the first engine to run the longer time, and has recently been sent in for the routine strip and overhaul.

The condition of the engine more than justifies this Ministry decision, and in rebuilding the engine for its next period of 1,260 hours the only parts which had to be scrapped and replaced were eight valve guides, one engine set of piston rings, one set of high-tension leads, one cooling baffle and four rocker box stirrups and nuts, total value £3 18s.

The carbon and sludge deposit on all parts was small. On pistons, cylinder heads and crankpins it was considerably less than is expected of engines with far less running to their credit. The sludge centrifugally deposited in the crankpins averaged only about 7 mm. thick. This speaks well for the design of the engine—and incidentally shows how the quality of oil is being maintained in wartime.

Returned to Engine

All main and big-end bearings went back into the engine untouched, with the exception of one connecting-rod bearing which showed slight dryness, easily cleaned out. Apart from the usual very small cracks which invariably appear at the dowel holes of the big-end bearings (often after the first few hours of running), all bearings were free from cracks in the white metal.

Three of the cylinder bores were actually within the dimensional limits for a new engine, and the fourth well within "repair limits," i.e., O.K. for rebuilding without need for regrind. All four bores were free from scores.

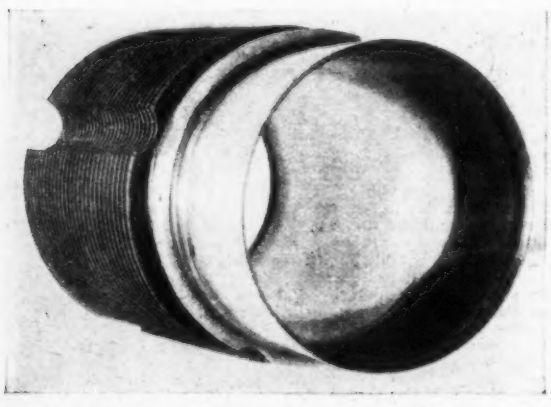
All rings on pistons were free and showed no scuffed surfaces. Gaps were approaching top limit, so new rings were fitted.

All ground gears showed their original grinding marks on the teeth. All polished gears showed excellent bedding surfaces; bedding of magneto-drive skew gears was exceptionally good. The oil-pump casing and gears were very good. The casing was free from scoring of any kind and the gears had excellent bedding surfaces.

Typical piston and rings. All the rings were free in their grooves.

Main and big-ends on crankshaft were well within drawing tolerances for a new engine. Crankshaft, camshaft, tappets, etc., were crack-detected, passed as satisfactory, and all refitted without attention.

There was no depth to any marks on valve stems and only slight pitting on valve faces, easily removed by regrinding. Of the eight valve seats in the cylinder heads



One of the four cylinders. Each is free from scores and dimensionally within limits which permit them to be returned to the engine without re-grinding. Three of the cylinders were actually within the dimensional limits for a new engine.

Rear end of crankshaft, showing camshaft drive gears. The original grinding marks appear as speckles. The depth of sludge in the crankpin is about 7 mm.

GIPSY'S 1,260 HOURS

only two (both exhaust) showed slight pocketing, easily cleaned up by recutting. All valve springs, etc., were satisfactory.

Three more 1,260-hour engines have since come in for overhaul and all of them in remarkably good condition, in fact, similar to the first one. It should be noted that during the 1,260 hours no intermediate partial overhauls are given; in fact, the only attention is the routine cleaning of filters and the periodical checking of ignition and valve adjustments, etc. Engine reliability has always been a matter of steady development, and the Gipsy Major and Gipsy Six series, as well as the Gipsy Minor and the Gipsy Twelve, are all derived basically from the Gipsy One created in 1927 by Major F. B. Halford, designer of every Gipsy engine.

The Gipsy One started life with an overhaul period of 300 hours, later increased to 450 hours. For the Gipsy Two, the inverted Gipsy Three, and the Gipsy Major One when it was introduced in 1932, the period was 450 hours. The Gipsy Major One was advanced in July, 1933, to 750 hours, in August, 1937, to 1,000 hours, and in April, 1942, to 1,260 hours.

"WAKE ISLAND"

THE defence of Wake Island by some 400 U.S. Marines against impossible odds was one of the most heroic incidents of the present war, and Paramount's film tribute to this gallant action is an obviously sincere attempt to tell the world just how magnificent it was.

It would, therefore, be particularly gratifying if one could give it full marks, but unfortunately we are concerned chiefly with that very aspect from which its most obvious shortcomings are manifested.

Let us say at once that the general atmosphere of a Pacific island garrison has been admirably captured, that the bombing by waves of Japanese dive-bombers is about as grimly realistic as anything of the kind so far seen, that Brian Donlevy gives a grand portrayal of the commanding officer and that Robert Preston and William Bendix provide a quite acceptable leavening of comedy as the two tough marines with a flair for getting into trouble.

Let us also say that most of the flying sequences are very well handled, that there is nothing wrong with the Wildcats and that the dive-bombers are near enough to the real thing to satisfy all but the most fastidious. After all, even Hollywood would find it difficult to borrow the genuine article from the Nippon Navy!

But why, oh why, do they spoil an otherwise intelligent production by making one little Wildcat—the garrison's last—blow a Japanese cruiser to smithereens with four little bombs that would hardly have dented her deck.

They were sensible enough not to wangle in any "love interest" for once, yet they succumb to the temptation of the "forlorn hope" stunt in about its most incredible form. After that, the Jap monoplanes in the Wildcats' gunsights that plunge earthwards as smoking *biplanes* are barely worth mentioning. The amount of destruction per hit was also far too satisfying when the Marines' 5in. guns opened up on the Jap destroyers at close range; but that is the trouble when models are used. Still it is all very exciting and, at the Plaza, will doubtless thrill and delight thousands of less exacting critics than the readers of *Flight*.

N. D. R.

A.O.C. EGYPT KILLED

AIR VICE-MARSHAL WILFRED ASHTON McCLAUGHRY, A.O.C. Egypt, and Lady Tedder, the wife of Air Chief Marshal Sir Arthur Tedder, lost their lives in the unfortunate air crash in Egypt, in which nine other people were killed. A memorial service was held at All Saints' Cathedral in Cairo.

A.V-M. McClaughry was an expert in fighter defence, and commanded a fighter group in this country up to about seven months ago. During the last war he commanded an Australian fighter squadron in France, and was awarded both the D.S.O. and the M.C.

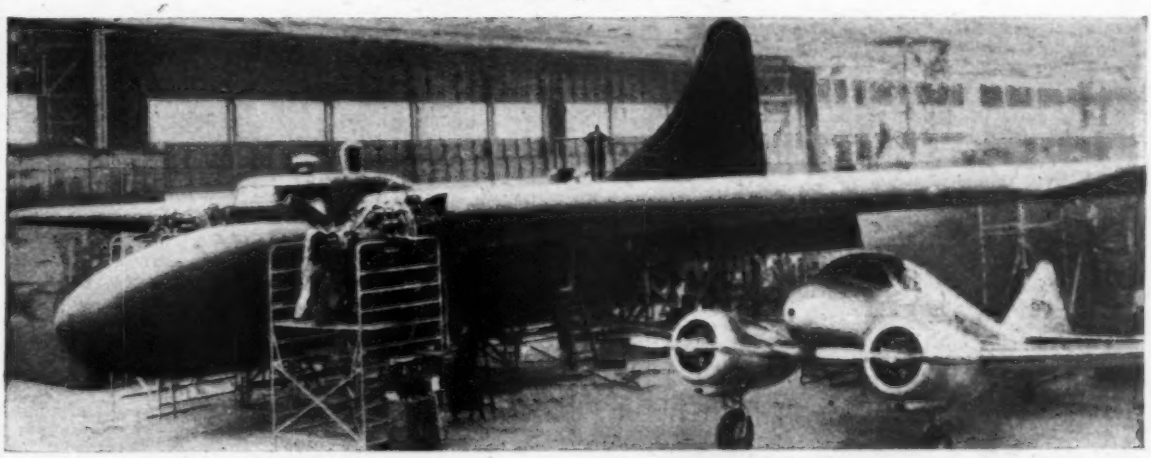
A.T.A. BENEVOLENT FUND

Fifth List of Subscriptions

THE appeal for support for this worthy fund is making good progress, and the fifth list of subscriptions appears below. Readers may like to be reminded that it was launched for the benefit of serving members of the A.T.A., and its funds cover mainly the making of grants to ferry pilots or their dependents in case of incapacity through accident, and to their dependents when lives are lost in the service of the A.T.A.

	£	s.	d.
Subscriptions already acknowledged	4,209	17	7
Bristol Aeroplane Co., Ltd.	1,000	0	0
Hordern Richmond Aircraft, Ltd.	10	10	0
No. 27 Maintenance Unit R.A.F.	6	14	10
Major E. G. Hayes	5	5	0
De La Rue Plastics, Ltd.	2	2	0
	£5,234	9	5

Curtiss-Wright Caravan



AERIAL FREIGHT CAR : A comprehensive view of the new Curtiss (C.76) Caravan which is nearing completion. For cheapness and also for strategic reasons its construction is almost entirely of wood. Span is 108ft. and it will have two Cyclone engines of 1,200 h.p. each.

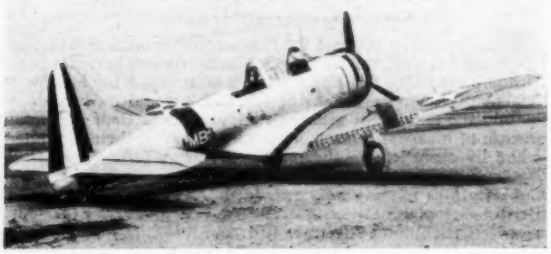
Aircraft of the Anglo-American Forces

Review of British and U.S. Types in Operational Service

THIS is the second instalment of an alphabetical list of some 70 different types of aircraft of British and American manufacture, the first 18 of which were given in last week's issue.

DAKOTA

DOUGLAS AIRCRAFT CO., INC., U.S.A. Twin-engined transport in service with the R.A.F. and the U.S. Army, to whom it is known as the C 47. It is a military version of the highly successful DC 3 passenger airliner and is powered by two 1,200 h.p. Pratt and Whitney Twin-Wasp R-1830-SIC3-G air-cooled radial engines. The main cabin is provided with a large loading door to pass bulky packages (such as spare engines). When required as a troop carrier it may be fitted with folding benches to accommodate 18 airborne or parachute troops. All-metal construction, except for control surfaces, is employed. Top speed is 230 m.p.h. at 8,500 feet, service ceiling 23,200 feet, and cruising range at 200 m.p.g., 2,125 miles Dimensions: Span 95 ft., length 64 ft. 6 in., height 17 ft., wing area 987 sq. ft.

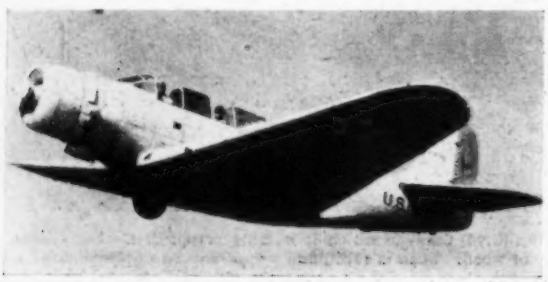


DAUNTLESS

DOUGLAS AIRCRAFT CO., INC., U.S.A. Two-seater dive-bomber in service with the R.A.F., the U.S. Army Air Force as the A 24 and the U.S. Navy as the SBD 3. The Dauntless is powered by a 950 h.p. Wright Cyclone GR-1820-32, nine-cylinder, air-cooled radial engine, and its top speed is reported to be 275 m.p.h. at 7,500 feet. It is of duralumin construction throughout and has a flush-riveted, stressed-skin covering; the flaps, which are perforated, split to fold up and down and act as dive-brakes. Full armament details are not available, but the U.S. types have two synchronised 0.50in. machine guns firing through the airscrew disc. Dimensions: Span 41 ft. 6 in., length 31 ft. 9 in., height 13 ft., wing area 335 sq. ft.

DEFIANT

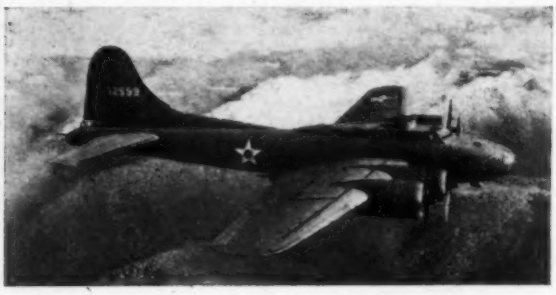
BOULTON-PAUL AIRCRAFT, LTD., GT. BRITAIN. Two-seater fighter in service with the R.A.F. Originally powered by a 1,030 h.p. Rolls Royce Merlin II, but later types of Merlin have subsequently been employed; top speed is now more than 300 m.p.h. The Defiant is notable for its armament, which is concentrated in a Boulton-Paul power-operated four-gun turret amidships, no forward-firing wing guns fitted. All-metal construction with flush-riveted stressed-skin is employed; the fuselage is monocoque and the wings are a two-spar structure with split trailing-edge flaps. The deck fairing behind the turret retracts to allow full traverse. Dimensions: Span 39 ft. 4 in., length 35 ft. 4 in., height 11 ft. 4 in., wing area 250 sq. ft.



DEVASTATOR

DOUGLAS AIRCRAFT CO., INC., U.S.A. Three-seater torpedo-bomber in service with the U.S. Navy, with whom its official designation is TBD 1. Powered by a 825 h.p. Pratt and Whitney Twin-Wasp Junior air-cooled radial engine, its top speed is 225 m.p.h. at 9,000 feet. The Devastator carries a 21 in. torpedo in a recess under the fuselage, but is not totally enclosed as its nose projects; a bomb-load may alternatively be carried. Defensive armament is limited to one synchronised 0.300 in. machine-gun above the engine cowling and a free 0.500 in. gun in the rear cockpit. Undercarriage retracts backwards and the skin of the wing outer panels is corrugated. Its range is 985 miles at 180 m.p.h. Dimensions: Span 50 ft., length 35 ft. 6 in., height 18 ft. 1 in.

AIRCRAFT OF THE ANGLO-AMERICAN FORCES

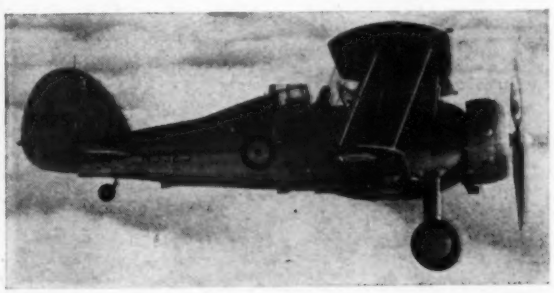


FORTRESS II

BOEING AIRCRAFT CO., U.S.A. Four-engined heavy long-range bomber in service with the R.A.F. and the U.S. Army Air Force as the B-17E. Powered by four 1,200 h.p. 14-cylinder Wright double-row Cyclone engines equipped with exhaust-driven turbo superchargers, the Fortress II has a top speed in excess of 300 m.p.h., a service ceiling of some 40,000ft. Armament is particularly good, consisting of power-operated gun turrets above the cabin, in the tail and amidships underneath; additionally, there is a gun position in the nose. The all-up weight is close on 25 tons, and the bomb-load reported to be about three tons. Dimensions: Span 103ft. 9in., length 73ft., height 15ft. 6in., wing area 1,486 sq. ft.

FULMAR

FAIREY AVIATION CO., LTD., Gt. Britain. Two-seater Fleet fighter in service with the Fleet Air Arm. Developed from the prototype P.4/34, which was designed to a dive-bomber specification, the Fulmar is substantially the same aircraft and is powered by a Rolls-Royce Merlin X giving 1,145 h.p. at 5,250ft. No performance figures, however, have ever been issued, but the P.4/34, with the Merlin II, was credited with 284 m.p.h. top speed. Armament of the Fulmar comprises four fixed .303 Browning machine guns in each wing. All-metal stressed-skin construction is employed, the wings fold for carrier stowage, and equipment includes deck-arrester gear, catapult attachment, and an inflatable dinghy. Dimensions: Span 46ft., length 40ft. 6in., height 14ft.



SEA GLADIATOR

GLOSTER AIRCRAFT CO., LTD., Great Britain. Single-seater Fleet fighter in service with the Fleet Air Arm in the more remote theatres of war. Powered by a Bristol Mercury IX air-cooled radial engine of 830 h.p., the Sea Gladiator was the last of a long line of biplane fighters, and did not go into production until 1939, although the prototype of the land version appeared several years earlier. The type (both land and sea) saw plenty of service in the early stages of the war, particularly in Norway and the Middle East. Their top speed is 255 m.p.h., service ceiling 32,800ft., and range 500 miles. Armament comprises two synchronised and two wing Browning machine-guns. Dimensions: Span 32ft. 3in., length 27ft. 5in., height 10ft. 4in., wing area 323 sq. ft.

GOOSE

GRUMMAN AIRCRAFT ENGINEERING CORP., U.S.A. Twin-engined amphibious flying-boat in service with the R.A.F. and the R.C.A.F. It is also employed by the U.S. Coastguard Service, to whom it is known as the G-21B. Powered by a pair of 450 h.p. Pratt and Whitney Wasp Junior SB2 engines, the Goose is doing very useful work as an ambulance with the Air/Sea Rescue Service. A crew of four is normally carried, and defensive armament consists of one fixed machine-gun in the nose, and a free gun in the aft turtle-deck. Bomb racks may be fitted under the wings. Top speed is 200 m.p.h. at 5,000ft., service ceiling 22,000ft., and range 800 miles at 190 m.p.h. Dimensions: Span 49ft., length 38ft., height 14ft., wing area 375 sq. ft.

HALIFAX

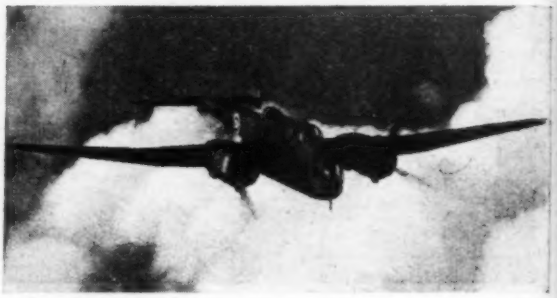
HANDLEY PAGE, LTD., Gt. Britain. Four-engined heavy bomber in service with the R.A.F., with a top speed of about 300 m.p.h., a maximum bomb-load of 5½ tons, and a maximum range of some 3,000 miles (these maximum figures cannot all be obtained simultaneously, of course). Power is supplied by four Rolls Royce Merlin XX liquid-cooled, "V" shaped, 12-cylinder engines each developing 1,175 h.p. at 20,500ft., and fitted with Rotol three-bladed, fully-feathering c.s. airscrews. Nose, tail and dorsal gun-turrets. Of the mid-wing type, with twin fins and rudders, the Halifax is of all-metal construction with flush-riveted, stressed-skin covering. Dimensions:—Span 99ft., length 70ft., height 22ft., wing area 1,250 sq. ft.

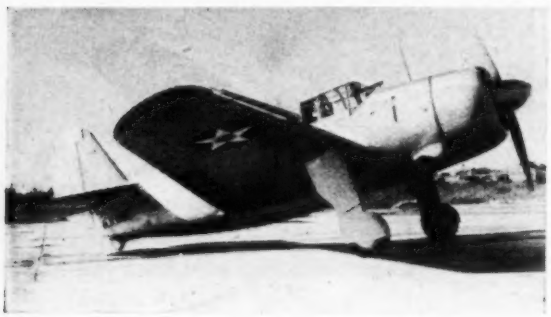
ENG. LIBRARY

AIRCRAFT OF THE ANGLO-AMERICAN FORCES

HAMPDEN

HANDLEY PAGE, LTD., Gt. Britain. Twin-engined medium bomber in service with the R.A.F. Although they went into service early in the war, their defensive armament was at first inadequate and the type was grounded for a time for improvement in this vital respect. Since then they have done yeoman service and have recently been adapted to carry torpedoes, with telling effect. Powered by two Bristol Pegasus XVIII nine-cylinder, air-cooled radial engines, each of 980 h.p., with de Havilland c.s. airscrews, the Hampden's top speed is 265 m.p.h. at 15,500ft., cruising speed 217 m.p.h. at 15,000ft., service ceiling 22,700ft., and maximum range about 2,000 miles. All-metal, flush-riveted, stressed-skin construction is employed. Dimensions:—Span 69ft. 2in., length 53ft. 7in., height 14ft. 11in., wing area 668 sq. ft.



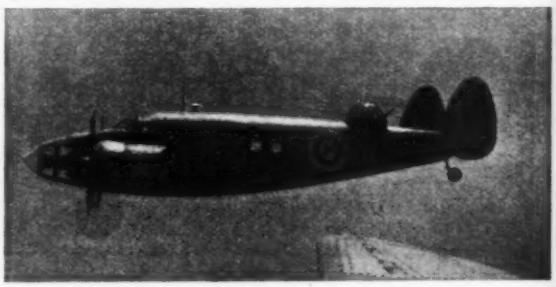


HELLDIVER

CURTISS-WRIGHT CORP., U.S.A. Two-seater dive-bomber in service with the U.S. Navy. The official designation is SB2C-1. Powered by a 1,750 h.p. Wright double-row Cyclone 14 GR-2600-B5 geared and supercharged air-cooled radial engine with Curtiss fully-feathering c.s. airscrew. This cantilever all-metal monoplane carries on the name of "Helldiver" originally bestowed on the "Curtiss 77" biplane or SBC-4. No performance figures nor armament details of the new Helldiver have yet been released for publication, but the former can be taken as showing a substantial improvement. The bomb load is carried internally, and the total disposable load exceeds 3,000 lb. It is of all-metal construction with smooth Alclad skin. Dimensions:—Span 49ft. 8in., length 35ft. 2in., height 16ft. 8in., wing area 422 sq. ft.

HUDSON

LOCKHEED AIRCRAFT CORP., U.S.A. Twin-engined reconnaissance bomber in service with Coastal Command of the R.A.F. Strangely enough, this aircraft, although an American product, is not in operational service with either the U.S. Army Air Force or the U.S. Navy. An adaptation of the civil Lockheed 14 airliner, the Hudson was ordered in emergency. Since then many hundreds have been delivered by air and have proved outstandingly successful. Two 1,200 h.p. Wright Cyclones supply the power and a normal crew of five is carried. The latest version, the Hudson V, has a top speed of 284 m.p.h. at 15,000ft., service ceiling 22,000ft., and a cruising range of over 2,000 miles. Dimensions: Span 65ft. 6in., length 44ft. 3in., height 11ft. 10in., wing area 551 sq. ft.



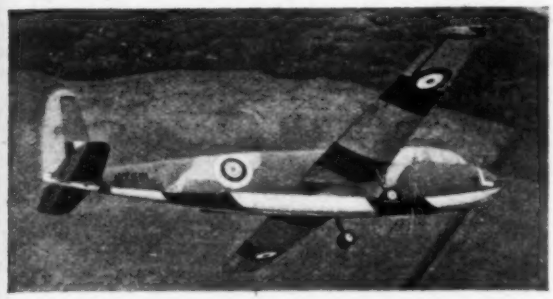
HURRICANE

HAWKER AIRCRAFT, LTD. Single-seater fighter in service with the R.A.F. and Fleet Air Arm. One of our most adaptable fighters, the Hurricane saw service in Europe and later shared with the Spitfire the honour of smashing the *Luftwaffe* bomber squadrons in the Battle of Britain. Powered by increasingly efficient models of the Rolls-Royce Merlin engine, the Hurricane has been adapted as a light bomber (the IIB) for low-level attacks across the Channel, as a four-cannon fighter (the IIC), for catapulting from merchant ships, and now as the Sea Hurricane for service on carriers. One version is armed with 12 Browning machine-guns as an alternative to four 20 mm. cannon. Top speed is 355 m.p.h. at 18,500ft., and service ceiling 35,000ft. Dimensions: Span 40ft., length 31ft., height 13ft. 1in., wing area 257½ sq. ft.

HORSA (Glider)

AIRSPEED, LTD., Gt. Britain. Heavy glider transport in service with the British Army. A high-wing cantilever monoplane of wooden construction. The fuselage and the leading portion of the wings forward of the spar are plywood covered, but the rest of the wings, and the tail unit, are fabric covered. The tailplane is mounted up on the fin. Entry is by large doors on both sides of the fuselage, and a tricycle undercarriage is fitted—the first time a glider has been so equipped—and special shock absorbers are fitted to the oleo legs to resist the impact of landings on rough ground. No information on weights, performance or the number of troops carried may yet be published. Dimensions: Span 88ft., length 67ft., height 21ft., wing area 1,148 sq. ft.

AIRCRAFT OF THE ANGLO-AMERICAN FORCES

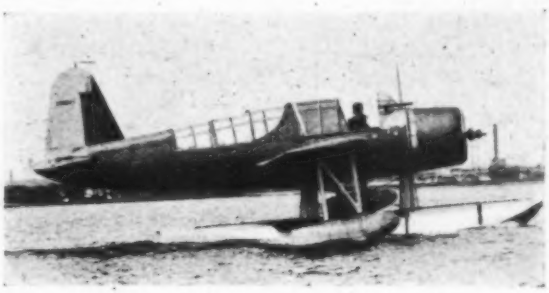


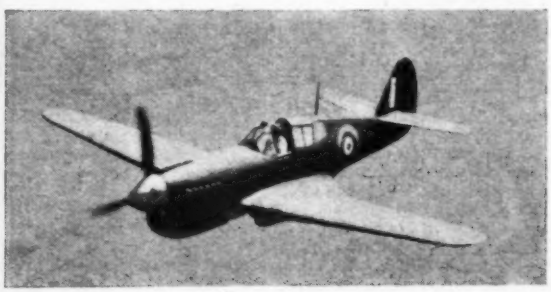
HOTSPUR (Glider)

GENERAL AIRCRAFT, LTD., Gt. Britain. A much smaller machine than the Horsa, the Hotspur glider is now providing the necessary training for Army glider pilots under R.A.F. instruction. It is a much better streamlined shape than the bigger machine, but is also of mixed wood and fabric construction and quite well finished, despite the fact that German experience would seem to show that gliders used to convey airborne troops must be considered primarily as "consumable goods." The Hotspur is a cantilever midwing type with an undercarriage comprising two oleo legs each fitted with a pair of wheels; these can be jettisoned for operational landings on a central skid, but are not jettisoned during training flights. Pupil and instructor occupy tandem seats in the nose cabin. Dimensions: Span 45ft. 11in., length 39ft. 9in.

KINGFISHER

VOUGHT-SIKORSKY AIRCRAFT, U.S.A. Two-seater Navy observation and reconnaissance aircraft in service with the Fleet Air Arm and the U.S. Navy, to whom it is officially known as the OS2U-3. Produced either as a seaplane with a single main float and fixed stabilising floats under the wings, or as a landplane with a fixed, unfaired undercarriage, the British version is powered by a 450 h.p. Pratt and Whitney Wasp Junior R-985 air-cooled radial engine, but the American version employs the SB-2 edition of the Wasp Junior. The fuselage and wings forward of the spar are metal covered. Top speed is 200 m.p.h., and range 908 miles. Dimensions: Span 35ft. 10in., length (landplane) 30ft. 1in., (floatplane) 33ft. 7in., height 13ft., wing area 261.9 sq. ft.



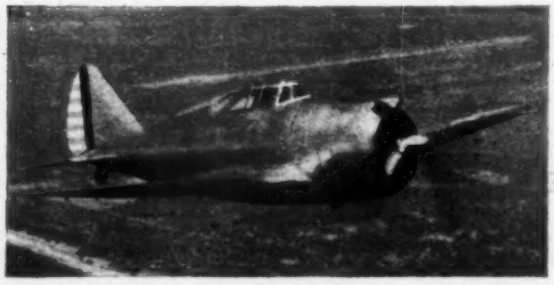


KITTYHAWK

CURTISS-WRIGHT CORP., U.S.A. Single-seater fighter in service with the R.A.F., the U.S. Army, and the R.C.A.F. A development of the Tomahawk, the Kittyhawk differs from its predecessor in having the more compact V-1710-F3R Allison engine of 1,150 h.p. and larger radiator "bulge" below the nose. It also differs from the Tomahawk in having six wing guns. Official American designation is P-40 D. Is one of the chief types of fighter in the Middle East and Pacific area and has a considerably improved performance over its predecessor, which could not compete with the best enemy fighters at the higher altitudes. All-metal construction, with smooth Alclad skin. Dimensions: Span 37 ft. 4 in., length 31 ft. 9 in., height 10 ft. 7 in., wing area 236 sq. ft.

LANCASTER

A. V. ROE AND CO., LTD., Great Britain. Long-range heavy bomber in service with the R.A.F. normally powered by four Rolls Royce Merlin XX 12-cylinder "V"-type liquid-cooled engines, but other engines, notably the Bristol Hercules 14-cylinder double-row sleeve-valve air-cooled radial engine, are also being fitted. Weighing 27 tons all-up, it carries a bomb-load of about eight tons and is one of the most efficient heavy bombers in existence to-day. Its top speed is approximately 300 m.p.h. and maximum range some 3,000 miles. Defensive armament comprises four gun-turrets—nose, dorsal, ventral and tail—which together mount ten Browning machine guns, and a crew of seven is carried. Dimensions: Span 102ft., length 69ft. 6in., height 20ft. 6in., wing area 1,300 sq. ft.



LANCER

REPUBLIC AVIATION CORP., U.S.A. Single-seater fighter in service with the R.A.F. and with the U.S. Army Air Force as the P43. Powered by a 1,100 h.p. Pratt and Whitney Twin-Wasp air-cooled radial engine, with exhaust-driven turbo-supercharger, it has since been well eclipsed by the same firm's Thunderbolt. Of all-metal stressed-skin construction, the Lancer is credited with a top speed of 375 m.p.h. at 23,000ft., and a cruising speed of 310 m.p.h. at the same altitude. Its armament consists of twin synchronised machine-guns in the top of the fuselage, and six wing guns. A range of nearly 1,000 miles at cruising speed makes it a particularly useful fighter. Dimensions: Span 36 ft., length 28 ft. 6 in., height 10 ft. 3 in., wing area 223.7 sq. ft.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

COMMERCIAL CONVERSION

Special Qualifications of the Stirling

THE idea, mentioned in a recent *Flight* editorial (December 10th), of converting bombers into transports by fitting new fuselages is of considerable interest and is probably the best solution to the problem of providing air transports immediately after the war.

I have in mind one type in particular. As the Short Stirling, I understand, was developed from a Short design for a large civil aircraft, would it not be comparatively easy to reconvert it for commercial use? At any rate, it would seem an easier task than converting a design which was intended for military use from the start.

Admittedly it is an ironical situation, but we have only ourselves to blame. "CIRRUS."

BOOST PRESSURE VARIATION

On Merlins, but Not Bristols

I CAN confirm that this phenomenon occurs on all Merlin engines and, moreover, at all positive boost pressures. The explanation is as follows:

The automatic boost control receives its controlling pressure from, and therefore controls, the pressure in the volute casing; it has no control over variations in pressure beyond this point. This induction trunk pressure is dependent upon piston displacement, that is r.p.m.

With the pressure in the volute casing being controlled at a datum boost, an increase in r.p.m. will cause a drop in pressure in the induction trunk, and vice versa.

On the Merlin engine, the boost gauge reading is taken from a connection situated between the volute casing and the induction trunk. Variations in pressure in the induction trunk will therefore be felt on the boost gauge.

Hence, if the constant-speed control is moved to give a drop in r.p.m. the induction trunk pressure will rise, and this rise will be shown on the boost gauge although the automatic boost control is still controlling at its datum boost in the volute casing.

This explains why the phenomenon is not apparent on Bristol engines, and, I imagine, on other engines where the boost gauge reading and boost controlling pressures are taken from like points. N. D. YOUNG.

Some Factors Which Affect Control

PERHAPS I can help to clear up the "boost pressure variation" question.

There is really one main reason for this, i.e., slight inaccuracy in the operation of the boost control mechanism.

This unit should maintain, within limits, a selected boost pressure over a range of r.p.m. and aircraft speeds. This it does, but like any other mechanism, with a slight degree of inaccuracy. This will take the form of an increase or decrease in boost pressure over or under that selected.

Of course, other factors affecting the boost come into play, such as the efficiency of the air intake system in the aircraft and "packing" as a result of forward-facing air intakes. But here again the boost control should compensate, and it does, though possibly not exactly.

The geometry of the engine controls may affect the accuracy with which the boost control operates.

The reason given by "Puzzled" is incorrect, since even in fine pitch, when his engine requires more air for a given boost pressure than in coarse pitch, the supercharger capacity is well above this requirement at zero boost and any reasonable altitude, and his engine is therefore running throttled.

I hope I have already answered his question as to why the boost control does not correct the rise in boost pressure.

Regarding Mr. Ashley's letter, the reason he gives in (1) is incorrect, since the supply from the supercharger is greater than the demand by the engine, which is why the air intake to the supercharger must be throttled. This holds good up to "rated boost" at "rated altitude." The reason he gives in (3) is incorrect for the same reason. Regarding (4) the boost control should correct any variation, but as I have already pointed out, it may not do so exactly.

What is necessary to understand the problem is a good knowledge of the working of a boost control.

This is really quite simple.

An exhausted aneroid, or capsule, is acted upon by the boost pressure developed by the supercharger. It contracts when the boost rises and expands when the boost falls. This movement is communicated to a control valve, which regulates the movement of the servo mechanism which actuates the engine throttle.

A small variation in boost pressure may not affect the aneroid sufficiently to cause any movement of the servo mechanism.

Again, the point in the induction system at which the tapping is taken for the pressure supply to the aneroid may cause a pressure difference between the boost pressure and the actual pressure obtaining in the boost control aneroid chamber.

This is a very general and incomplete description of a boost control, but I hope it may help some readers to get a better "picture" of the question.

The methods of interposing the boost control in the engine control circuit vary, but nearly all modern aircraft engines are fitted with a variable-datum boost control. This means that instead of being capable of controlling at only one pressure, the boost control can govern over a wide range of pressures. This is accomplished by varying the datum of the aneroid by means of the pilot's lever.

One more point. Assume an aircraft is climbing at "rated boost" and international r.p.m. Once it has reached the rated altitude of the engine, the boost will begin to fall, since the engine will then be at full throttle. Similarly, if the r.p.m. is reduced, without altering the throttle at rated altitude, the boost will fall for the same reason.

I hope this very brief treatment of the subject will prove of some assistance. M. C. GREY, A.R.Ae.S.

Increased Slipstream Pressure

I READ with interest in your correspondence columns of the December 10th issue the reference to boost pressure variation. As my employment gives me the opportunity to ground-run aircraft engines, I have found this boost variation taking place. When changing from fine pitch to coarse, I have found the revs of the engine do not start to drop as soon as the pitch of the airscrew changes to coarse, therefore high revs are maintained by the engine for some seconds as the changing into coarse is taking place.

Therefore, the maintained high revs and coarsening of pitch of airscrew for this short period put a higher induction pressure on the intake, due to greater slipstream pressure being imposed by the coarsening of the airscrew, in turn building up boost pressure.

This increase in boost pressure is maintained only until the airscrew has become so coarse that engine revs start to fall. At this instant of revs drop the extra boost pressure starts to drop with the normal drop of the engine as the airscrew becomes fully coarse. F. W. CHAPMAN.

CONSERVATION OF FUEL

Important Factors in War and Peace

WHAT I hope is not a typical view of direct petrol injection was mentioned by Mr. G. S. Henderson in a letter in *Flight* of December 3rd. The apparent coolness with which Mr. Henderson dismisses this development in aircraft engine design should serve as a warning to others, equally ill-informed, who may think likewise. Mr. Henderson unwittingly provoked an attack on himself by his statement ". . . other than performance at height." At this stage in technical development, when altitude is one of the most important factors in performance to be considered, to dismiss it in such a manner is an anachronism of the first magnitude.

Even if this were the only advantage it possessed it would be a more than adequate reason for its adoption. But it is not. In the fight against weather, which is a battle nobody is anywhere near winning, direct injection enters as a considerable force.

At low temperatures an engine thus fitted will function much better than with the normal arrangement of combustion. Over and above both these factors are of equal importance in war and peace, and if we are not to be left behind in development we must see that we get busy producing a direct-injection design. J. H.

OVER THE TAIL. Beauforts of Coastal Command out on operations against an enemy convoy in the English Channel.

Royal Air Force and Fleet Air Arm News and Announcements

First Canadian Bomber Group

IT has been announced that, starting from January 1st, 1943, the first R.C.A.F. bomber group ever to be formed has come into being. The new group is fully operational, and is under the command of Air Vice-Marshal G. E. Brookes.

No ceremony marked the opening. The bomber stations involved—which until January 1st had been operating under R.A.F. command—were instructed to take their orders from the new group headquarters. A greeting to the new group came from Air Marshal Sir Arthur Travers Harris, A.O.C. in C., Bomber Command, in these words:—

"A happy birthday and a prosperous New Year to the R.C.A.F. Group. As individuals and as R.C.A.F. squadrons you have done fine work already. As the R.C.A.F. Group I know that you will maintain and even surpass your own high standards. We are proud to have you with us. Hail Canada! Hail Hitler!—but with bombs"

Air Vice-Marshal Brookes replied:—"Your good wishes for our birthday much appreciated. We are proud to be part of Bomber Command, and will do our utmost to help maintain its high traditions."

Appointment

The London Gazette, December 29th, 1942.

GENERAL DUTIES BRANCH.

Grp. Capt. O. W. DE PUTRON to be Provost Marshal and Chief of Air Force Police, vice Grp. Capt. F. G. STAMMERS, O.B.E. December 21st, 1942.

Promotions

The London Gazette, January 1st, 1943.

GENERAL DUTIES BRANCH.

Air Comdre. (temp.) J. B. COLE-HAMILTON, C.B.E., is granted the rank of Air Cmdre. (war subs). November 21st, 1942.

The London Gazette, January 5th, 1943.

GENERAL DUTIES BRANCH.

Air Comdre. A. P. M. SANDERS, C.B.E., to be Act. Air Vice-Marshal. January 1st, 1943.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following award for gallantry and determination in bombing attacks against enemy landing grounds:—

DISTINGUISHED SERVICE CROSS

Temp. Sub. Lt. (A) S. W. BIBBE, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:

DISTINGUISHED FLYING CROSS

F/O. R. J. CAMPBELL, R.C.A.F., No. 405 (R.C.A.F.) Sqn.—F/O. Campbell has distinguished himself by his courageous behaviour, efficiency and enthusiasm for operations, which have made a notable contribution to the successes achieved by his squadron.

F/O. E. G. M. CORSER, R.A.A.F., No. 218 Sqn.—In July, 1942, when returning from an attack on Dusseldorf, F/O. Corser's aircraft was attacked by three enemy fighters, but by his skilful, evasive tactics he brought his aircraft back to base undamaged. Again in September, despite intense anti-aircraft fire, he flew over the target area for 25 minutes to discover his correct aiming point.

F/O. J. A. MORRIS, R.C.A.F., No. 419 (R.C.A.F.) Sqn.—This officer has participated in many operational sorties and has never failed to complete his mission. On one occasion all the petrol in the starboard tanks of his aircraft leaked away, but by skilful airmanship he flew the aircraft safely back to England. On another occasion, while attacking Bremen, his aircraft was heavily engaged by the enemy ground defences and seriously damaged. Despite this, F/O. Morris flew it back safely and crash-landed without further injury to his aircraft or crew.

F/O. R. H. PHILLIPS, R.A.F.V.R., No. 15 Sqn.—F/O. Phillips has taken part in many operational sorties when his aircraft has been heavily engaged by enemy defences and badly damaged, but this has never deterred him from his efforts to locate and bomb the target. On one occasion when his aircraft was attacked and damaged by a night fighter, his skilful evasive tactics enabled his rear gunner to destroy the enemy fighter.

F/O. M. RUSSELL, R.A.F.V.R., No. 161 Sqn.—This officer has taken part in many operational sorties, and has always displayed the greatest enthusiasm and determination to get to grips with the enemy.

Repair Over Target

F/O. G. S. SMITH, R.A.F.V.R., No. 142 Sqn.—As captain of aircraft, F/O. Smith is always undeterred by the strongest enemy defences or adverse weather. On one occasion he was detailed to make an attack on a factory in Northern France. On his first run over the target, technical trouble developed with the bombing panel. This was repaired and, although severely harassed by searchlights and anti-aircraft fire, he descended to 1,500 feet before releasing his bombs.

P/O. E. DAMPIER-CROSSLEY, R.A.A.F., No. 50 Sqn.—This officer has always displayed outstanding qualities as a captain of aircraft, pressing home his attacks with determination, resolution and courage. He has taken part in attacks on many of the enemy's most heavily defended areas, and has obtained some excellent photographs.

P/O. A. J. FRANCIS, R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer has always shown an eagerness for action, a keenness in his work, and a courageous spirit which calls for the highest praise. He has been an inspiration to all those with whom he has come in contact.

P/O. C. INGLEBY, R.A.F.V.R.—This officer

Wing Cdr. A. C. Brown, D.F.C., of No. 407 Squadron, who was recently awarded the D.S.O.

SERVICE

recently volunteered for a sortie against Dusseldorf and flew in the role of rear gunner. For the past three months he has been in charge of the wireless section of a flight at his unit and has shown great organising ability.

P/O. J. R. JONES, R.A.A.F.—This wireless operator has participated in many successful sorties over enemy territory. At all times he has shown great devotion to duty and a high degree of courage which have set a fine example to the squadron.

P/O. W. E. MCALPINE, R.A.F.V.R., No. 15 Sqn.—P/O. McAlpine has taken part in many operational sorties, as mid-upper gunner. Throughout his operational career this officer has displayed the greatest enthusiasm to get to grips with the enemy.

P/O. G. K. BOYD, R.A.F.V.R.—Throughout his many operational sorties P/O. Boyd has been an efficient captain of aircraft whose one aim has been to reach and bomb his objective, whatever the difficulties or dangers to be faced.

P/O. J. M. MCLEAN, R.A.A.F., No. 50 Sqn.—P/O. McLean's navigation has been of the highest order, and has in a large measure contributed to the successes achieved by his pilot and crew. On a night in August, 1942, at Osnabruck, and again in September, 1942, at Wilhelmshaven, he obtained some excellent photographs.

Mine-laying Navigation

P/O. K. J. METHERAL, R.C.A.F., No. 408 (R.C.A.F.) Sqn.—As navigator, this officer has taken part in many sorties, including such heavily defended targets as Bremen, Wilhelmshaven, Hamburg, Essen and Cologne. He has also completed many mine-laying operations.

P/O. P. PARNHAM, R.A.F.V.R., No. 409 (R.C.A.F.) Sqn.—This officer has taken part in many operational sorties, including two over Berlin. He is a rear gunner who possesses great courage and skill. He took part in a daylight attack on the German battleships *Scharnhorst* and *Gneisenau*, and although repeatedly attacked, skilful evasive tactics were made possible by the excellent running commentary he gave to his pilot.

P/O. R. J. REYNOLDS, D.F.M., No. 408 (R.C.A.F.) Sqn.—In September, 1942, during an attack on a target in Northern France, the aircraft in which this officer was flying was attacked by an enemy fighter. Displaying exceptional coolness and determination, he kept up a constant fire until the enemy aircraft was destroyed. P/O. Reynolds has shown exceptional keenness and his high degree of technical skill as wireless operator/air gunner has greatly contributed to the successes achieved.

P/O. D. H. ROWLANDS, R.A.F.V.R., No. 97 Sqn.—P/O. Rowlands, who is a captain of aircraft, has displayed exceptional keenness throughout his operational career. In September, 1942, he was detailed to bomb targets in the Ruhr. This he achieved with remarkable success and also secured an excellent photograph.

P/O. A. SMITH, R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This fearless air gunner has done much to maintain a high standard of morale by his high example, both in the air and on the ground. In action he is cool and collected and on several occasions when in a perilous position his quick appreciation of the situation has undoubtedly saved his aircraft.

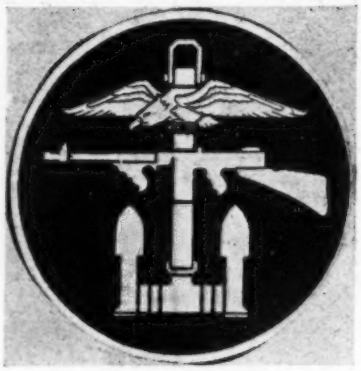
P/O. W. W. G. SMITH, R.A.F.V.R., No. 161 Sqn. (since deceased).—P/O. Smith was an excellent operational captain of aircraft, who always displayed great determination and courage. He set an excellent example by his great devotion to duty.

P/O. J. A. M. WAYLAND, No. 420 (R.C.A.F.) Sqn.—This officer has shown outstanding devotion to duty during all his operational sorties. He has participated in attacks on many of the enemy's most heavily defended targets in Germany and was a member of the crew which bombed the *Gneisenau*. He has also taken part in many mining operations.

P/O. R. C. WISEMAN, R.A.A.F., No. 50 Sqn.—This officer has consistently performed all the tasks allotted to him He has taken part in many attacks on targets in Germany, including Lubeck and Munich.

P/O. J. E. WORTH, R.A.F.V.R., No. 115 Sqn.—During the last 4½ months this officer has taken part in many operational sorties over the most heavily defended areas in Germany. He is a navigator of great skill. One night in June, 1942, his aircraft was badly damaged by anti-aircraft fire and attacked by night fighters while on the outward journey. Nevertheless the attack on the objective was pressed home, and owing to the outstanding navigational skill of P/O. Worth, the aircraft was flown back to base safely.

P/O. J. L. WRIGHT, R.N.Z.A.F., No. 75 (N.Z.) Sqn.—This officer has participated in many attacks



The new Combined Operations Command Badge, which is red on blue and is identical for all three Services. It consists of a stockless anchor, a Tommy gun and an eagle, representing the sea, land and air forces.

Group Capt. A. G. Malan, D.S.O., D.F.C. and Bar, who now commands the fighter station from which he flew as a flight lieutenant in the Battle of Britain.

AVIATION

on some of the most heavily defended targets in Germany. His painstaking search to identify and attack the target is worthy of the highest praise. On a night in September, 1942, when returning from an attack on the Ruhr, a Ju 88 was observed. By skilful manœuvring, P/O. Wright enabled his gunner to open fire and destroy the enemy aircraft.

W/O. M. D. CULLINANE, R.N.Z.A.F., No. 97 Sqn.—W/O. Cullinane, a captain of aircraft, has set a high standard of courage and devotion to duty. He took part in an attack on Dusseldorf in September, 1942, and achieved particular success.

W/O. E. WRIGHT, R.A.F.V.R.—W/O. Wright has participated in attacks on the enemy naval base at Trondheim, and on an aircraft factory at Warnemunde, where he achieved excellent results. Recently he has obtained some splendid photographs.

DISTINGUISHED FLYING MEDAL.

Flt. Sgt. P. M. P. CRAMPTON, No. 50 Sqn.—Flt. Sgt. Crampton has taken part in many attacks on the enemy's most heavily defended targets. He also participated in the "1,000-bomber raids" on Cologne and the Ruhr. He is a thoroughly reliable captain of aircraft who attacks his targets with courage and resolution. One night in August, 1942, while returning from an attack on Dusseldorf, his aircraft was heavily engaged by enemy ground defences. Despite the severe damage inflicted, Flt. Sgt. Crampton piloted his aircraft safely back to base.

Flt. Sgt. K. A. CRANKSHAW, R.N.Z.A.F., No. 75 (N.Z.) Sqn.—Flt. Sgt. Crankshaw has taken part in many operational sorties, the majority of which have been over the most heavily defended areas in Germany. He has always displayed the greatest keenness to attack the enemy's searchlight and gun positions. His skilful fire against enemy fighters and excellent instructions to his pilot have contributed largely to the safe return of his aircraft.

Flt. Sgt. M. ELLWOOD, No. 97 Sqn.—Flt. Sgt. Ellwood has participated in many raids over Germany and occupied territory, including the daylight attacks on Augsburgh and Le Creusot. His skill as a wireless operator has contributed materially to the successes achieved.

Flt. Sgt. J. W. FAIRBROTHER, R.A.F.V.R., No. 44 Sqn.—Flt. Sgt. Fairbrother has participated as a wireless operator/air gunner in many attacks on the enemy, often in adverse weather, and has never had a wireless failure

Flt. Sgt. M. D. FRECKER, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—Flt. Sgt. Frecker has acted as captain on a large number of sorties, including attacks on Essen, Poissy, Rostock, Bremen and other well-defended targets. On one occasion, after attacking Essen, his aircraft was badly damaged during an engagement with an enemy fighter. Despite this, he flew it back to this country and made a successful crash-landing.

100 *per cent.* Radio

Flt. Sgt. E. L. HOOKER, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.—Flt. Sgt. Hooker has had a long and outstanding career as wireless operator/air gunner and has never had a failure with his wireless equipment. He has participated in attacks on some of the most heavily defended targets, including Wilhelmshaven, Essen, Dortmund, Cologne and Berlin.

Flt. Sgt. R. J. E. HUTT, R.A.F.V.R., No. 138 Sqn.—This navigator has a high reputation which is amply justified. His reliability and judgment, combined with marked ability, have contributed materially to a series of successful sorties. Since November, 1940, he has taken part in attacks on a wide range of targets, including Berlin, Brest, Hamburg, Mannheim, Lorient and Kiel.

Flt. Sgt. C. K. JOHNSTON, No. 214 Sqn.—In April, 1940, this wireless operator/air gunner assisted in the destruction of two enemy fighters when his aircraft was intercepted over the Danish coast. One night in June, 1942, he took part in a raid on Emden. Shortly after leaving the target area his bomber was attacked by two enemy fighters. Flt. Sgt Johnston put up a formidable defence and one of the attackers was destroyed.

Flt. Sgt. K. W. LIGHT, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—As wireless operator/air gunner, this airman has participated in attacks on targets both in Germany and in German-occupied territory. He has at all times displayed commendable courage and devotion to duty.

Flt. Sgt. T. A. MEIKLE, No. 138 Sqn.—Flt. Sgt. Meikle, who is an air gunner, has taken part in many operations, both in the Middle East and from the United Kingdom. At all times his unfailing cheerfulness and keenness have set an example to his squadron.

Flt. Sgt. R. J. OATES, R.C.A.F., No. 97 Sqn.—This rear gunner has taken part in attacks against many of the enemy's most strongly defended objectives. He has always set a very high standard which has been a fine example to all.

Flt. Sgt. G. R. OLIVER, No. 150 Sqn.—As wireless operator, Flt. Sgt. Oliver has displayed high technical skill which has proved of the utmost value to his captain. He has shown great interest in navigation and has often assisted by obtaining frequent astronomical fixes

Flt. Sgt. J. T. PICKFORD, R.A.F.V.R., No. 207 Sqn. (Since reported missing).—This airman, who has always displayed great courage and determination in the face of the enemy, has participated in many operational sorties, including targets at Cologne, Rostock, Essen, Brement, Emden and Danzig.

SERVICE AVIATION

Air Efficiency Award

THE Air Efficiency Award has been conferred on the undermentioned officers, who are hereby authorised to wear the ribbon.

Acting Air Commodore G. H AMBLER, O.B.E., A.F.C., A.A.F.

Acting Air Commodore H. PEAKE, A.A.F.

GROUP CAPTAINS.—P. C. Stewart, A.A.F.; B. S. Thynne, A.F.C., A.A.F.; F. Crerar, C.B.E. (Acting), A.A.F.; A. S. W. Dore, D.S.O. (Acting), A.A.F.; E. H. Stevens (Acting), A.A.F.

WING COMMANDERS.—The Hon. M. Aitken, D.S.O., D.F.C., A.A.F.; J. C. H. Allan, M.B., Ch.B., A.A.F.; G. O Budd, D.F.C., A.A.F.; I. R. Campbell-Orde, A.A.F.; G. L. Denholm, D.F.C., A.A.F.; R. G. Grant-Ferris, M.P., A.A.F.; L. E. A. Healy, O.B.E., A.A.F.; Sir A. P. Hope, Bart., D.F.C., A.A.F.; J. E. Howell, M.B., Ch.B., A.A.F.; J. P. Huins, O.B.E., B.Ch., M.R.C.S., L.R.C.P., A.A.F.; R. G. Kellett, D.S.O., D.F.C., A.A.F.; J. H. Little, D.F.C., A.A.F.; G. C. Pinkerton, D.F.C., A.A.F.; M. Robinson, A.F.C., A.A.F.; G. Shaw, D.F.C., A.A.F.; P. D. O. Vaux, A.A.F.; J. M. Bazin, D.F.C. (Acting), A.A.F.; J. Cherry, O.B.E. (Acting), A.A.F.; P. R. Foley (Acting), A.A.F.; R. Hiscox (Acting), A.A.F.; J. H. Hodge (Acting), A.A.F.; J. L. Jack, M.B.E., M.C. (Acting), A.A.F.; C. H. Lewis (Acting), R.A.F.V.R.; W. H. M. Walker (Acting), R.A.F.V.R.

SQUADRON LEADERS.—G. F. Anderson, A.A.F.; G. W. B. Austin, A.A.F.; G. C. Bonner, A.A.F.; E. C. Deanesly, D.F.C., A.A.F.; A. G. Douglas, D.F.C., R.A.F.V.R.; The Hon. R. N. Frankland, A.A.F.; H. J. Greenland, R.A.F.V.R.; J. Hill, R.A.F.V.R.; E. P. Lash, R.A.F.V.R.; M. R. MacArthur, D.F.C., R.A.F.V.R.; G. G. McLannahan, R.A.F.V.R.; A. Rintoul, A.A.F.; L. A. Sutherland, A.A.F.; W. B. Thompson, R.A.F.V.R.; E. M. Webb, R.A.F.V.R.; W. H. Wetton, A.A.F.; H. C. S. Brand (Acting), R.A.F.V.R.; D. L. Clackson (Acting), A.A.F.; E. C. Fieldsend (Acting), A.A.F.; A. C. W. Norman (Acting), A.A.F.

FLIGHT LIEUTENANTS.—R. Bennett, R.A.F.V.R.; P. M. Bristow, R.A.F.V.R.; C. H. Hunter, R.A.F.V.R.; C. W. Lofthouse, R.A.F.V.R.; J. M. Longley, R.A.F.V.R.; W. E. J. Lunn, R.A.F.V.R.; O. N. Massey, R.A.F.V.R.; F. W. M. Jensen (Acting), R.A.F.V.R.; J. R. Juleff (Acting), R.A.F.V.R.; J. K. Keates, A.F.C. (Acting), R.A.F.V.R.; H. M. Louch (Acting), R.A.F.V.R.; G. C. R. Moody (Acting), R.A.F.V.R.

FLYING OFFICERS.—G. W. Harrison, R.A.F.V.R.; D. MacFarlane, R.A.F.V.R.; C. R. Stannard, R.A.F.V.R.; J. W. Welford, R.A.F.V.R.; W. A. T. Cardew (Acting), R.A.F.V.R.; H. Sawdon (Acting), R.A.F.V.R.; P/O. R. S. Coates, R.A.F.V.R.

Waziristan Operation

THE KING has been graciously pleased to approve the following awards in recognition of gallant and distinguished service with the Royal Air Force during the operations in Waziristan:—

DISTINGUISHED SERVICE ORDER

Grp. Capt. W. V. L. SPENDLOVE.

M.B.E. (MIL.)

Act. W/O. W. T. ALLEN.

DISTINGUISHED FLYING CROSS

Sqn. Ldr. E. W. TREMLETT.
Act. Sqn. Ldr. R. D. WILLIAMS.
Act. Sqn. Ldr. A. M. ENGINEER, I.A.F.

DISTINGUISHED FLYING MEDAL

L.A/C. (now Sgt.) H. L. ROBERTS.

Roll of Honour

Casualty Communiqué No. 189.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—Sgt. J. Adam; Sgt. F. G. Bellchambers; F/O. J. E. Hanson, D.F.M.; Sgt. E. R. Harris; Sgt. J. E. Hatherly; P/O. G. B. Hawes; Sgt. C. R. Hawkins; W/O. E. J. Knight; Flt. Sgt. L. E. Marjoram; Sgt. H. Nuttall; P/O. V. W. Parry, D.F.C.; P/O. R. C. Porter; Sgt. J. McF. Ramsey; Sgt. E. E. Roberts; Sgt. J. M. Robinson; Act. Sqn. Ldr. G. E. Weston, D.F.C.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. J. Robinson, D.F.C.

WOUNDED OR INJURED IN ACTION.—P/O. R. C. Scott; P/O. F. H. Smith.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. A. R. Beaven.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. C. F. Du Toit; Sgt. M. I. Gass; Sgt. R. W. Johnson; Sgt. G. A. Lindsay; Wing Cdr. M. F. B. Read; Sgt. S. S. Waldman.

MISSING.—Flt. Sgt. C. H. Barrow; Sgt. R. Booth; Sgt. E. L. Bradshaw; Sgt. T. E. Brett; Sgt. J. Buchanan; Sgt. J. Burke; Sgt. R. W. Cadman; Sgt. D. Campbell; Sgt. S. C. Carter; Sgt. P. C. Cate; Sgt. A. D. Chance; Flt. Sgt. F. Christie; Sgt. H. M. Clark; Sgt. R. S. Cole; Sgt. K. J. Cooper; Sgt. K. R. Curran; Sgt. J. W. Dawson; Sgt. N. E. Dowden; P/O. J. R. Drake; Sgt. T. Duffy; Sgt. F. T. Elliot; Sgt. R. B. L. Flint; Act. Flt. Lt. G. C. Foers; Sgt. A. Ford; Sgt. R. B. Gadsson; Sgt. J. K. Gergory; Flt. Sgt. R. A. Golding; Sgt. H. S. Greenwood; Sgt. R. H. Gresham; Sgt. M. Griffiths; Sgt. J. M. Hamilton; Sgt. N. Henderson; Sgt. P. Hereford; Sgt. H. Hewitt; Sgt. M. R. Hutson; Sgt. J. S. James; Sgt. C. E. Jeffrey; P/O. J. L. Jones; Sgt. J. T. Jones; Sgt. L. H. La Vie; Sgt. G. A. McIntyre; Sgt. N. McNeil; Flt. Sgt. G. O. Maugham, D.F.M.; Sgt. S. Messham; Sgt. L. Millband; Sgt. R. L. Millbank; Sgt. H. S. Moore; Sgt. A. Norregaard; Sgt. C. O'Callaghan; P/O. V. H. Parry; P/O. S. C. Pearse; P/O. S. Peel; Sgt. R. S. Pettican; Sgt. E. H. C. Phillips; Sgt. M. A. Pickering; Sgt. R. C. Prior; Sgt. F. J. Robinson; Sgt. W. V. Roderick; Sgt. F. L. Roleston; Sgt. H. R. Rowe; Sgt. D. Salisbury; Sgt. J. A. Sharpe; Sgt. P. D. Sherman; Sgt. L. Smythson; Sgt. E. G. Souter; Sgt. J. Speed; Sgt. G. W. Spowart; Sgt. G. Stark; P/O. J. D. V. S. Stephens, D.F.M.; Sgt. R. Q. Stevens; Sgt. H. E. Sullivan; Act. F/O. J. E. Tate; Sgt. G. G. Tennant; Sgt. A. H. Threlfall; Sgt. F. Tooth; Sgt. E. Topping; Sgt. K. T. Turvey; Sgt. E. H. Tytherleigh; Sgt. P. Van-Lelyveld; P/O. J. H. Vincent; Sgt. A. J. R. Vineberg; Sgt. H. E. Webber; Sgt. R. E. West; Sgt. R. E. W. Williamson; Sgt. J. B. Woodman.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. R. C. Carrington.

KILLED ON ACTIVE SERVICE.—Sgt. J. R. Butler; Sgt. W. D. C. Crawford; Sgt. W. H. Gull; P/O. P. A. Harding; P/O. A. J. A. Leclezio; Act. Sgt. J. R. Lewis; L.A/C. F. W. Ling; F/O. E. Lyon; Sgt. S. E. Monger-Godfrey; L.A/C. L. T. Moore; Act. Sqn. Ldr. P. T. Parsons; Sgt. G. H. Patterson; F/O. B. R. K. Petter; L.A/C. R. K. Price; Sgt. G. Rae; Act. Sgt. E. M. Roberts; Cpl. R. O. Roberts; Act. Sgt. D. M. Thomas; Sgt. R. S. Timewell, L.A/C. R. T. Wall; Flt. Lt. W. H. I. Walmsley.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. W. G. Banham; L.A/C. B. O. Burgess; L.A/C. S. Burnell; Sgt. G. L. E. Edwards; L.A/C. A. McGloin; L.A/C. C. E. Ross; L.A/C. T. H. Scott; P/O. T. Stephenson; Sgt. N. E. Taylor.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. H. W. Crawshaw; A/C.1 D. Drinkwater; Sgt. K. D. H. Fraser; L.A/C. D. A. Toms; Cpl. T. Wiseman.

DIED ON ACTIVE SERVICE.—A/C.1 H. E. Blissett; Cpl. C. W. Day; A/C.1 W. H. G. Elders; A/C.2 A. Gooch; L.A/C. A. Hardisty; A/C.1 F. Heald; L.A/C. K. M. Hill; L.A/C. A. Hood; L.A/C. H. W. J. Johnson; L.A/C. K. McG. Moore; L.A/C. F. J. Reed; Cpl. J. C. Roe; Cpl. W. C. Silverwood; L.A/C. E. J. Thomas; Sgt. R. A. L. Thornhill; A/C.2 J. N. Williamson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. P. W. Carruthers; Sgt. H. McL. Stokes; P/O. W. H. Wood.

Pulling the long bow. Air gunners of a bombing station indulge in a spot of toxophilitic amusement.

Field Marshal Lord Birdwood of Anzac fame taking the salute at a W.A.A.F. march past.

SERVICE AVIATION

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. H. M. Hyde.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. K. S. Carlsson.
WOUNDED OR INJURED IN ACTION.—Sgt. J. G. Bond; F/O. A. R. Mathews; Flt. Sgt. A. A. Taylor.
MISSING.—Sgt. G. F. Dare; Sgt. N. R. Jones; Sgt. G. H. Shannon; Sgt. K. McK. White.
KILLED ON ACTIVE SERVICE.—Sgt. J. R. Bannister; Sgt. N. R. Buchanan; Sgt. A. M. Kettle.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. L. G. Galloway; Sgt. A. S. Watt; P/O. T. L. Wright.
WOUNDED OR INJURED IN ACTION.—Sgt. J. G. B. A. Groleau.
MISSING, BELIEVED KILLED IN ACTION.—Sgt. T. McL. M. Hunter; P/O. A. B. Morlidge; W/O. E. W. Murphy; Sgt. H. D. Price; Flt. Sgt. S. V. Stowe; P/O. H. J. Stuart; Sgt. H. S. Sveinson.
MISSING.—Sgt. F. C. Adsett; P/O. M. W. Atkinson; P/O. R. J. Ayles; Sgt. M. Ben-Hertz; Sgt. J. R. P. Burke; Flt. Sgt. J. T. Campbell; Sgt. C. A. Carpenter; P/O. J. H. Carrick; Sgt. A. M. Carter; Sgt. J. H. Charlesworth; Sgt. B. B. Copeland; P/O. G. M. Gillies; Sgt. H. F. Gowlay; Flt. Sgt. A. M. Greene; Sgt. D. G. Hackett; Sgt. A. H. Hansford; Sgt. D. A. Ivers; Sgt. J. C. Kitchen; P/O. J. L. P. Le Page; Sgt. W. G. McCron; Sgt. O. J. McEvoy; P/O. A. L. MacGillivray; Flt. Sgt. G. F. McHugh; Sgt. C. H. McPherson; Flt. Sgt. A. A. Margolis; Flt. Sgt. J. D. R. Menard; Sgt. A. McK. Mowbray; Sgt. C. J. Newbert; Sgt. C. G. Nugent; P/O. E. C. Olsen; Sgt. C. E. Pickard; Flt. Sgt. R. D. Ressor; Sgt. T. A. Stephenson; Sgt. L. J. Tighe; Flt. Sgt. T. E. Turpin; P/O. F. E. Vale; Sgt. W. G. Ward; Sgt. L. H. Williams; Sgt. H. R. Williamson.
KILLED ON ACTIVE SERVICE.—Sgt. B. D. Crane; Sgt. J. W. M. Gilbert.
DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. F. O. Cadham.
DIED ON ACTIVE SERVICE.—Sgt. L. J. Macdonald.

Royal New Zealand Air Force

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. H. Moller.
MISSING.—Flt. Sgt. G. E. Dale; Sgt. M. H. Elliott; P/O. M. R. Jeffery; Sgt. R. N. H. Jones; Sgt. G. W. Martin; F/O. J. L. Meredith; Sgt. G. Nelson; Sgt. A. I. Parkinson; Sgt. T. W. Peacock; P/O. R. I. Phillips; Flt. Sgt. S. D. Wells.
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. E. W. B. Howard.

South African Air Force

MISSING.—Lt. G. Cohen; Flt. Sgt. R. L. Manley; Air Sgt. J. C. Van Eck.
KILLED ON ACTIVE SERVICE.—Lt. T. Finlayson.
DIED ON ACTIVE SERVICE.—Capt. H. G. MacLaren.

Indian Air Force

KILLED ON ACTIVE SERVICE.—Sqn. Ldr. H. Runganadhan.

Casualty Communique No. 190.

Royal Air Force

KILLED IN ACTION.—Sgt. E. H. Bastow; Sgt. J. F. P. Behn; Sgt. J. Bennie; P/O. W. E. A. Chiddick; Sgt. D. L. Crowhurst; Sgt. A. Green; Sgt. P. L. Hall; Sgt. L. H. Hawkins; Flt. Lt. D. E. Healy, D.S.O.; Sgt. J. C. H. R. Jaeger; Sgt. R. L. Partington; Sgt. H. A. D. Pocock; P/O. H. W. Tracy; Act. Flt. Lt. A. Ward; Sgt. R. Weymouth; P/O. R. Whyte.
PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. T. H. Beament; Sgt. B. N. Burnett; Sgt. T. J. Delaney; Sgt. A. S. Hatton; Sgt. A. W. Holman; Sgt. J. H. Hunt; Sgt. A. R. Langston; Sgt. J. F. Nesbitt; Sgt. S. E. Smith.
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. B. Climie; Sgt. A. R. Holmes; Sgt. W. L. Huxley; Sgt. R. V. Kemp; F/O. T. A. Lumb; Sgt. J. C. D. McHardy; Sgt. W. L. Munns; Sgt. K. J. Raiswell; Sgt. J. Rooney; Sgt. R. Summers; Sgt. E. Thomas; Sgt. S. T. Woodbridge; Sgt. J. R. Wright.
WOUNDED OR INJURED IN ACTION.—Flt. Sgt. K. S. Nicholls; Sgt. H. Tunwell.
DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. J. H. Chandler.
MISSING, BELIEVED KILLED IN ACTION.—P/O. R. L. Albery; W/O. C. R. K. Bools; F/O. N. J. Briant; F/O. E. R. Butterworth; Sgt. V. J. Coombs; Flt. Sgt. D. L. T. Craig; Sgt. J. R. Dawson; Sgt. A. H. G. Desmond; W/O. K. F. Edwards; Sgt. J. Forbes; Sgt. A. B. Fraser; Sgt. B. F. Goldsmith; Flt. Sgt. N. F. T. Goldsmith, D.F.M.; Sgt. G. Green; Act. Sqn. Ldr. W. R. Greenslade, D.F.C., A.F.C.; P/O. K. H. Harrison, D.F.M.; Sgt. J. Hockenhull; Sgt. A. E. Holding; Sgt. W. J. Howes; Sgt. F. L. Hughes; Sgt. G. W. Jackson; Sgt. J. F. Killilea; P/O. D. W. Lennard; Sgt. R. C. Loombe; Sgt. F. A. McCluskey; Sgt. N. J. McMaster; Sgt. K. O. Mackay, D.F.M.; Sgt. E. L. Moore; Sgt. A. E. Musgrave; Flt. Sgt. W. Orange; P/O. C. J. Osmond; Flt. Sgt. T. I. R. Owen; Sgt. G. W. Rhodes; P/O. B. G. Robinson; Sgt. F. A. Robinson; Sgt. J. H. Scorer; Sgt. G. Slater; Sgt. M. K. Smith; Sgt. A. Waring.
MISSING.—Flt. Sgt. F. A. Andrews; P/O. J. H. Barton; Sgt. T. H. Billingham; Sgt. J. J. Bowles; Sgt. P. B. J. Butcher; Sgt. R. Carson; Sgt. D. G. Chacksfield; Sgt. S. A. Conibear; Sgt. K. E. Crewe; Sgt. G. E. Dowsett; Sgt. T. R. Elliott; Sgt. L. Fitzgerald; Sgt. J. W. Flint; Flt. Sgt. R. S. Fraser; Act. Sgt. A. Gander; Sgt. J. W. R. Haley; Sgt. K. T. Harbridge; P/O. A. H. Henderson; Sgt. S. G. Hunt; P/O. B. C. H. King; P/O. J. A. C. Kite; Sgt. J. F. Maher; Sgt. W. Maskell; Sgt. R. Mathews; F/O. A. W. R. Morisse; Sgt. T. H. Parker; Sgt. J. Porter; P/O. W. N. Ramage; P/O. A. G. Richards; Sgt. I. H. Ridge; Sgt. G. H. Sadler; Sgt. H. Sansome; Sgt. J. R. S. Scott; Sgt. J. G. Stuckless; Sgt. D. H. Tarver; Sgt. T. F. Thompson; Sgt. J. Vincent; Sgt. N. S. Whales; Sgt. R. A. Whitefield; P/O. R. Whitelock; P/O. N. A. G. Wilberforce; Sgt. P. H. Wood.
MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. T. F. McCarthy; Flt. Sgt. D. Shackell.
KILLED ON ACTIVE SERVICE.—Sgt. A. V. Barkel; P/O. C. Berry; L.A/C. C. C. Buckley; P/O. J. Chinery; F/O. H. J. Davidson; L.A/C. J. A. Deedman; L.A/C. P. H. F. Diprose; L.A/C. O. Firmin; L.A/C. S. Franks; W/O. D. A. Gee; Sgt. J. Gracey; Sgt. N. D. Green; W/O. B. H. Herbert; P/O. G. C. N. Hill; Flt. Sgt. A. Hoy; Flt. Sgt. L. Jones; Sgt. C. P. P. Lowe; Flt. Sgt. H. L. Middlemast; Sgt. W. Morgan; L.A/C. C. H. Myatt; Sgt. A. Ogden; L.A/C. S. J. Ribbands; P/O. N. Thomas; Sgt. R. G. Tinsley; L.A/C. M. R. Woozley.
WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. D. J. Calder; Sgt. G. A. Lloyd; Flt. Sgt. D. McCracken.
DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. H. Allworth.
DIED ON ACTIVE SERVICE.—F/O. C. L. Broad; A/C.1 R. S. Cole; L.A/C. J. C. Darling; P/O. R. C. Fournie; A/C.1 W. Galley; L.A/C. W. J. Hemsley; L.A/C. A. Irvine; A/C.1 R. J. Johnston; A/C.1 E. W. Jones; A/C.2 E. R. Maxfield; A/C.1 G. C. Milne; L.A/C. G. R. Nelms; Act. Cpl. C. Roberts; Cpl. S. T. Stevens; Sgt. W. P. Tizard; L.A/C. F. J. G. Wood.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 S. Evans.

Royal Australian Air Force

KILLED IN ACTION.—P/O. J. E. Delarue; Sgt. J. F. Guppy; Sgt. J. B. Taplin.
DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. C. M. Campbell.
MISSING, BELIEVED KILLED IN ACTION.—F/O. L. C. Dorward; Flt. Sgt. J. M. Gibson.
MISSING.—Sgt. T. L. F. Bailey; Sgt. R. M. G. Banbury; Sgt. B. Boyton; Sgt. W. N. Fethers; Sgt. J. Harris; Sgt. H. C. Hunt; Sgt. A. Maclean; Sgt. G. J. Matheson.
MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. R. Masters.
KILLED ON ACTIVE SERVICE.—Act. Sgt. R. P. Bowden; Sgt. R. F. A. Downes; Flt. Sgt. R. N. B. Scott; Sgt. G. A. G. Wood; Sgt. R. Ziser.

In New Guinea. Sqn. Ldr. Truscott, D.F.C., who did so well in the Battle of Britain, and Sqn. Ldr. L. Jackson, now serving at Milne Bay.

Royal Canadian Air Force

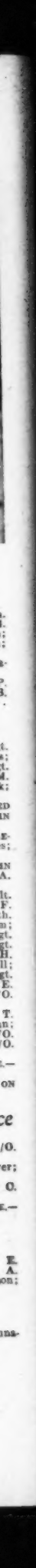
KILLED IN ACTION.—Sgt. J. M. Armstrong; Sgt. J. G. W. Beauregard; Flt. Sgt. A. C. Challis; P/O. G. H. Edgett; F/O. R. S. Erickson; Sgt. N. Gislason; Sgt. J. G. Howells; Sgt. M. Hudema; Sgt. M. F. O'Driscoll; Sgt. J. E. Park; Sgt. J. B. Sandiford; Sgt. M. W. Waterworth.
PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. L. M. Leech.
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. S. L. Innes; Sgt. E. M. Leftly.
DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. J. J. E. Cote; Flt. Sgt. G. A. Hogarth.
MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. G. P. Fargher; Sgt. J. Forman; Sgt. R. F. McIntyre; Sgt. K. A. Peters; P/O. L. I. Smith.
MISSING.—Sgt. D. S. Benner; Sgt. H. Broom; Sgt. R. Doherty; Sgt. S. G. E. Dunn; Flt. Sgt. C. J. H. Fry; Flt. Sgt. B. J. Hardesty; Sgt. E. W. Haylund; Sgt. L. J. Labarge; Sgt. G. J. H. McElroy; Sgt. D. D. Miller; Sgt. D. A. Mitchell; Sgt. J. L. O'Grady; Flt. Sgt. S. A. Palmer; Sgt. R. J. Peters; Sgt. G. E. Robson; Flt. Sgt. T. E. Powell; Sgt. J. H. Shaw; Sgt. R. Sillis; P/O. F. L. Todd.
KILLED ON ACTIVE SERVICE.—Sgt. R. J. T. Colvin, Sgt. H. E. Hicks; Sgt. T. F. Hyndman; Sgt. N. C. Meyers; P/O. J. H. Patterson; P/O. W. M. Poupore; P/O. R. G. Riddell; F/O. L. V. O. Smith; F/O. F. W. Turvey.
WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. P. Campbell; Sgt. H. D'Aperang.
DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. L. W. Scobie.

Royal New Zealand Air Force

KILLED IN ACTION.—P/O. R. Lonsdale.
MISSING, BELIEVED KILLED IN ACTION.—W/O. F. A. Schaw.
MISSING.—Sgt. R. T. Eria; Sgt. A. D. Glover; Flt. Sgt. H. S. Rodger; F/O. K. Tahiwi.
KILLED ON ACTIVE SERVICE.—Flt. Sgt B. O. Williams.
WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. J. O. McCabe.

South African Air Force

KILLED ON ACTIVE SERVICE.—2/Lt. F. E. Gaylord; Air Sgt. W. H. McElney; Lt. G. A. Pieterse; 2/Lt. D. H. Vleeman; Lt. C. N. Wilson; 2/Lt. J. P. Zahn.

Indian Air Force

KILLED ON ACTIVE SERVICE.—F/O. Raghunathan.